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ACTIVATED SLUDGE IN MILWAUKEE*

Test of Process for More Than a Year Leads to Adoption for Milwaukee—Advantages of Process—Cost Compared with Imhoff Tanks and Sprinkling Filters—Conclusions Reached to Date.

For about two years the speaker, as chief engineer of the Sewerage Commission of Milwaukee, has been carrying on experiments in sewage disposal to determine what method would give the best results when treating Milwaukee's sewage, which now amounts to 65 million gallons per day, and will amount to 100 million by 1915. As a part of these tests, an investigation has been continued for more than a year on the activated sludge method of treating sewage. As a result of which the speaker finally determined to recommend this process as the one most adaptable to Milwaukee requirements for the following reasons:

First: Because it produces a better effluent than any other known process of sewage treatment, except land treatment or intermittent sand filtration.

Second: It can be built upon a comparatively small area.

Third: It produces no objectionable odors or flies.

Fourth: It produces a sludge of sufficient value to meet the cost of its reduction to a fertilizer, and therefore relieves the city of the difficult, complicated and wasteful method of sludge disposal common to all other processes.

Fifth: It is subject to complete and satisfactory control throughout its operation.

Sixth: It is not materially influenced by climatic conditions.

Seventh: Occupying a small area, its first cost is less than any other known process from which an equal character of effluent can be obtained.

Eighth: Its operating cost is not prohibitive.

The above determinations have been deduced after more than a year's investigation of the process made by a very competent staff of scientific and practical men, who have been engaged for many years in designing and building sewage disposal works.

The experiments began in the laboratory, where but a few gallons a day were treated, progressed to small tanks where about 600 gallons per day were treated, then to tanks treating 70,000 gallons, and finally to tanks now treating a million gallons.

The activated sludge process put in plain language may be described as follows: It consists of passing raw sewage through tanks of any reasonable depth, from 8 to 20 feet, in which a certain volume of activated sludge is always present. The sewage, as it passes through the tank, is constantly and intimately mixed with the activated sludge by means of air forced into the bottom of the tank under low pressure, but of sufficient volume to

create a violent disturbance throughout the whole body of the liquor.

From the tank the mixture passes to a second tank where the sludge settles to the bottom, the clear liquor passing over a weir to its ultimate destination. The first tank is termed the aerating tank and the second the sedimentation tank.

In order to maintain the proper volume of activated sludge in the aerating tank, a portion of that which settles in the bottom of the sedimentation tank must be pumped back into the aeration tank at or near the point where the raw sewage enters. The balance of the sludge is dewatered and reduced to a fertilizer base.

To produce a clear, non-putrescible effluent from the Milwaukee sewage, about four hours' aeration is required, twenty per cent of activated sludge maintained in the aerating tank and about 1.75 cubic feet of free air per gallon of sewage treated.

The activated sludge is produced from the sewage and is composed of millions of those species of bacteria common to sewage and which nature has provided to destroy organic matter subject to decomposition; hence the name "Activated Sludge." These bacteria are afforded food, lodging and air in the most intense form, and are thus surrounded with those environments which enable them to do their most efficient work.

The process is similar to that which transpires in a rapidly flowing brook into which organic matter has been discharged, and the only things which must be supplied are an abundance of air and good, rich sludge.

The liquor produced from a well operated plant is clear and practically free from suspended or colloidal matters, and both it and the sludge are absolutely odorless. The latter does not remain so for more than 48 hours, after which decomposition sets in, and therefore it must be pressed and dried within that time, and when dried it contains no objectionable odor whatever. We believe it contains sufficient fertilizing value to pay the cost to the city of Milwaukee for pressing and drying.

The process reduces the free and albuminoid ammonias contained in the sewage to ammoniacal nitrogen, which is the valuable constituent in fertilizers. This nitrogen has an almost constant value of 10 cents per pound. The Milwaukee sludge produces from 50 to 70 pounds per million gallons of sewage treated. In addition to this, from 10 to 20 pounds of available phosphoric acid is produced, also worth about 10 cents per pound; but without estimating the probable available value of this phosphoric acid or the fats produced, which are also worth about 4 cents per pound, but may be too small in volume to pay for the cost of removal, the commercial

*Slightly condensed from a paper presented before the Conference of Mayors of the State of New York by T. Chalkley Hatton, Chief Engineer of Sewerage Commission of Milwaukee, Wis.

value of the sludge produced in Milwaukee has so far averaged \$6.00 per million gallons of sewage treated.

From all the data at present available it is believed the sludge can be reduced to a fertilizer basis for about \$3.00 per million gallons of sewage treated, including overhead charges, which will represent a very good profit that will partially meet the cost of supplying the air used in the process.

However, assuming that it will cost as much to reduce the sludge as we can obtain from its sale, we are still ahead of the game, for the sludge has been completely disposed of without nuisance to anyone, which is a thing not yet accomplished by any other sewage treatment process now known that is at all applicable for the Milwaukee conditions.

The greatest expense involved in the operation of the process is the air used. In Milwaukee this expense amounts to \$4.38 per million gallons of sewage treated, which is based upon treating fifty million gallons per day, and includes all fixed and overhead charges, except engine room and outside plant labor, but does include boiler room labor.

The entire Milwaukee plant, including power house, sludge disposal works, railroad tracks, aerating and sedimentation tanks, will occupy less than 20 acres of ground, and will amply provide for the treatment of 100 million gallons of sewage per day, whereas the Imhoff tank and sprinkling filter system would have required 65 acres.

The estimated cost of the activated sludge system is about equal to the cost of the Imhoff tanks alone to treat the same volume of liquor; and the cost of the sprinkling filters would be in addition, or about \$1,600,000 more. Based on a fixed charge of 7½% for interest and depreciation, the Imhoff and sprinkling system meant an annual extra burden upon the taxpayer of \$110,000 per year, or \$3.00 per million gallons of sewage treated, which is more than one-half the whole cost of air used in the activated sludge process, and this does not take into account the extra cost of the sterilizing agent which would have to be added to the sprinkling filter effluent before it could be safely discharged into the lake water, and which we found would cost an additional \$2.50 per million gallons of sewage treated.

The speaker don't want to be understood as recommending this process wholesale, but he feels sure it will largely succeed the present methods of sewage disposal, particularly in cities of considerable size, because it fulfills one of those requirements for which the world is now striving, "the conservation of valuable wastes," and does so without nuisance to humanity.

The speaker is quite aware that the process is not fully developed in all its features and that there are many matters of an engineering character which must be determined before an ideal plant can be designed for this method.

Mr. George T. Hammond, engineer of design for the Brooklyn Bureau of Sewers, made statements in the Engineering News of April 27th, 1916, in a summation of the process to date, to the effect that the sludge problem was giving the greatest trouble; that air distribution troubles had been pretty general, and that "none of the problems surrounding the activated sludge process are even fully understood."

Such a broad statement is not fair to those who have been engaged in the investigation of this process, and if left unchallenged, might give you the impression that all the speaker has stated in this paper is founded upon experiments from which no definite conclusions are warranted.

Speaking for Milwaukee alone, the sludge problem has been solved to the extent that it can be dewatered, by pressing, from 99% to 75% moisture without the addition of any lime or other foreign matter, and it can be done without prohibitive expense, such expense being dependent upon the mechanical appliances provided for handling the sludge.

It can be dewatered from 75% to 10% moisture by any one of at least three types of direct-heat dryers. Guarantees to that effect are in our hands from the manufacturers of the dryers, said guarantees embracing the cost exclusive of handling to and from the dryer; this latter cost being dependent upon the mechanical appliances provided to handle the sludge.

After drying to 10% moisture, the product can be kept in a dry storage house indefinitely without nuisance. The speaker has kept a box of it upon his office desk for four months and no odor is apparent.

There is a ready sale for all we can produce. The fertilizer producers in Chicago having assured us they will take our annual output at a price based upon the ammoniacal nitrogen content determined upon a dry basis.

So far as our investigations have been made, all of the sludge we have secured produces sufficient nitrogen to warrant the cost of its reduction to a fertilizer base.

After operating this process for one year in Milwaukee we have had no air troubles with any form of diffuser used in the continuous flow process. Our investigations have been conducted with a view of determining the most efficient air diffuser, but time alone can solve this problem. Up to date, however, either open grid or filter plate may be used with satisfactory results. They may not be the best that can be produced after some years of actual trial.

The fundamental problems have been solved for Milwaukee to the following extent:

The area necessary to treat a certain volume of sewage.

The volume and pressure of air required to secure a certain standard of purification.

A satisfactory method of mixing air with the sewage.

The cost of air required.

The volume and character of activated sludge to mix with the sewage to secure fixed results.

The volume of sludge, on dry basis, produced from the sewage.

The characteristics and commercial value of the sludge.

A practical method of dewatering the sludge and preparing it for the market.

A ready market for all sludge produced.

The only essential problems which have not yet been satisfactorily solved are the proper size and type of sedimentation tank; the best type of aerating tank to get the greatest efficiency from the air (that is, whether baffles are or are not desirable); and the actual cost of preparing the sludge for the market. But the speaker fully believes these will be solved within the next 90 days to the extent that a satisfactory design can be developed.

In considering the applicability of this process of sewage treatment to the conditions of any given city there are just a few points which it might be well to call to your special attention.

While the process is flexible and easy to control, still it cannot be left to the kind mercies of Providence, but must be operated under competent supervision, which is perhaps a blessing in disguise. It has unfortunately become the practice in America to permit many important sewage disposal plants to worry along without competent supervision. Thus many well designed plants have proven utter failures. The time has come when City

Fathers should realize that it requires just as competent and constant supervision to satisfactorily operate a sewage disposal plant as a water filtration plant.

The process requires the expenditure of constant power. The cheaper this power can be supplied the more adaptable the process is commercially. With a small unit and high power cost the process might easily become prohibitive.

The degree of purification required to meet local conditions must be carefully considered. If these can be satisfactorily met by an effluent high in bacteria and suspended matters, slightly turbid and putrescible in a day or two, the activated sludge process would be too expensive. Unlike most of the other well known processes, the sludge must be taken care of and constantly treated and requires as much intelligent supervision as any other part of the process.

The whole process, omitting the sludge disposal and power equipment, is self contained. That is, it is carried out in one-tank units, each unit being complete in itself with a wall dividing the aerating compartment from the sedimentation compartment.

From ten to twelve million gallons can be treated upon one acre of ground, which is about one-fifth the area required for sedimentation tanks and sprinkling filters. The tanks are very plain in design and can be constructed at minimum cost. If baffles are desirable, they can be built of either concrete or wood.

Large and costly outfall sewers necessary to carry the sewage beyond the community to a point where it can be treated without nuisance are not necessary because there need be no nuisance connected with the treatment of sewage by the process.

The sludge nuisance is eliminated. Anyone who has examined the disposal plants of Europe and witnessed the rapidly growing nasty nuisance connected with all those plants where the sludge is not carried out to sea, can appreciate what getting rid of sewage sludge for all time means to the community.

The process can be carried out as effectively in cold as in warm weather except that slightly more air per gallon of sewage treated is required in cold weather to secure the same character of effluent. Ordinarily it is permissible to discharge a lower grade sewage effluent into a body of water in cold weather than in warm weather, so this about equalizes the volume of air required throughout the year.

There is no loss of head required through the process, as is the case with the sprinkling filters. This frequently saves the cost of pumping and deep outfall sewers.

Many municipalities, both in England and America, have been and are conducting experiments upon this process of sewage treatment, and all with promising results, so far as the speaker is aware. The city of Houston, Texas; Escanaba, Mich., and Milwaukee, Wis., have adopted it as most suitable to their conditions.

It is not expected that these first plants will be perfect in results, as this condition can only be realized after many plants have been built and operated and the weaknesses determined, but if the world had waited for a perfect automobile before purchasing one the horse would never have been supplanted.

The speaker, however, believes that few if any more large sewage disposal plants embracing Imhoff tanks and sprinkling filters will be constructed in America after the activated sludge process is better understood by the sanitary engineer engaged in the design of sewage treatment works.

Discussions of this paper by Glenn D. Holmes and J. A. Giles will appear next week.

WILSON AVENUE INTAKE TUNNEL*

Tunneling and Constructing Concrete Lining Simultaneously—Concrete Mixing in Tunnel—Transporting Concrete by Compressed Air.

By F. H. BERNHARD.

In rock tunnels of similar character that have been built by contract it has been the practice to complete the mining of the tunnel before the concrete lining began. All of the rock would be hauled up and stored or otherwise disposed of on the surface. As the concreting began the rock would be crushed at the shaft mouth or crushed stone brought thereto and mixed with sand and cement. The mixed concrete would be taken down the shaft and hauled to the lining forms, being placed behind these by hand. If the concrete had to be hauled a considerable distance from the shaft in a long drift, it frequently attained its initial set before reaching the forms. On an average 30 to 35 feet of tunnel could be lined in this way. This process is therefore slow and costly.

It was believed that if mining and concreting could be carried on in different sections of the same drift simultaneously by taking stone directly from the heading to the mixer, many economies would result. The delay incident to waiting for all mining to be finished would be eliminated; needless hauling of rock would be avoided; delivery of properly mixed concrete to the forms would be assured. It was found that the run-of-mine rock included considerable fine stone which would probably serve instead of sand in making good concrete. Numerous tests verified this, the samples proving to be very strong. It was therefore decided to use the rock without sand and even without crushing, the large lumps being removed by screening.

As soon as the mining was well under way, designs were made of a concreting plant capable of being used in the tunnel without hindrance to the mining. A great deal of study was given to this with the result that the plant developed by the city's engineers has proven en-

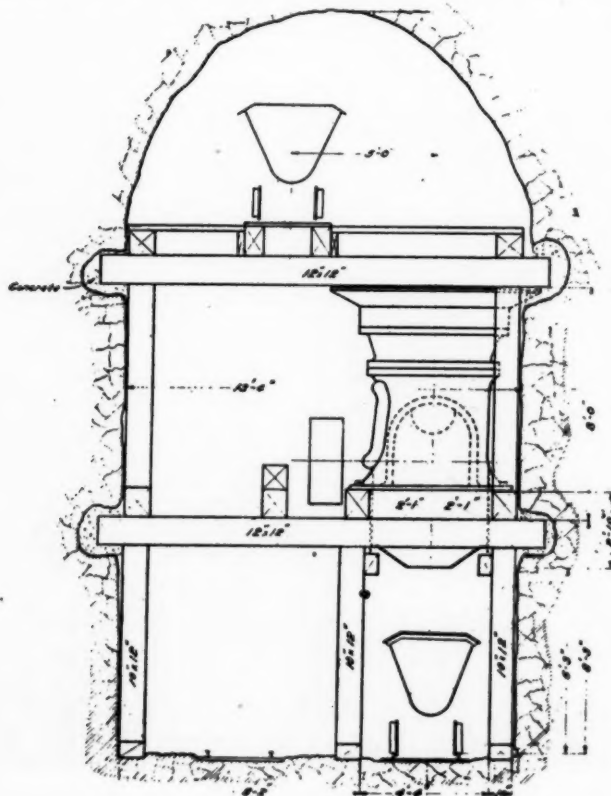
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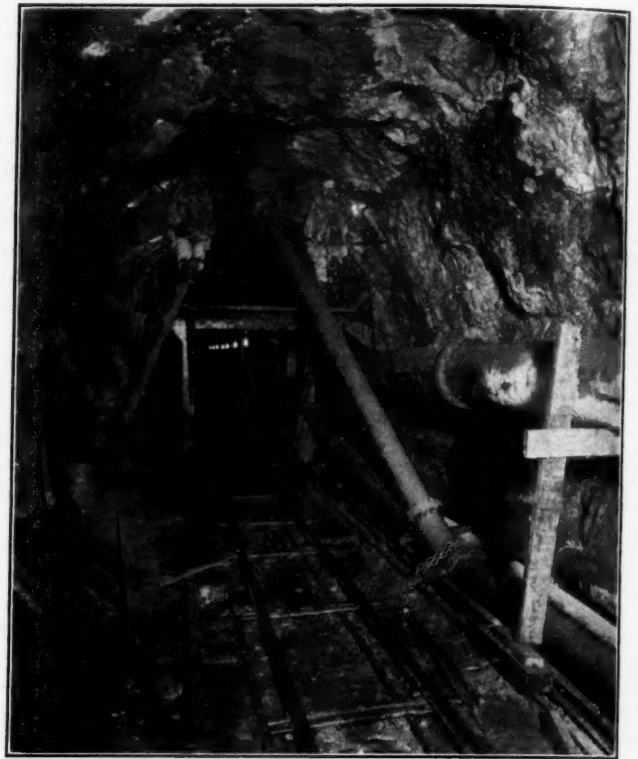
INCLINE FOR DELIVERING MATERIAL TO MIXER, AND SCREEN END OF CONCRETING OUTFIT.

tirely successful. This plant consists of two units, each arranged on a structural steel framework mounted on wheels and capable of traveling on one of the regular tracks. The first includes an inclined track up which the loaded cars are drawn by an electric hoist, an inclined steel screen with 4 inch holes on which the rock is dumped from the car, and an electrically driven belt conveyor that carries all the stone coming through the screen to the hopper of the concrete mixer. The second unit adjoins this in tandem and includes the mixer, which is operated by compressed air, and two reserve compressed air tanks, each of 14 cubic feet capacity, for maintaining the air pressure during operation of the mixer. The cars are brought direct from the heading and dumped one by one on the screen. Lumps over 4 inches are placed into an empty car and hauled up the shaft.

The concrete mixture consists of one part cement to 4 of mixed coarse and fine stone. From the mixer the concrete is driven by air pressure through 8-inch steel pipe as far as 700 feet to two forms. As these are brought nearer to the mixing plant, the pipe is shortened. After 12 working days the screening and mixing plant is advanced 700 feet. For the main tunnel, steel forms made of structural steel and plates and mounted on roller-bearing wheels are used. These are 30 feet long and two are used in each drift where concreting is going on. A special track is temporarily laid for the forms. A single track for rock haulage is laid through the open center of the forms. At the side there is room for carrying the ventilating and compressed air pipes unobstructed through the forms. The concrete sets only about 16 hours before the forms are moved ahead. Low guide walls are built of hand-mixed concrete in wood forms ahead of the steel forms, to serve as accurate guides for the latter, so that the finished lining may be perfectly in line. Under contract work on other tunnels it was the custom to follow the bore as blasted in order to reduce trimming. In the Wilson avenue tunnel trim-



CRUSHER IN TUNNEL NEAR LAWNDALE AVENUE SHAFT.



HEAD END OF CONCRETING FORM. CONCRETE DISCHARGE PIPE SLOPING UP TO TOP OF FORM.

ming is practically eliminated by seeing that the mining is properly done.

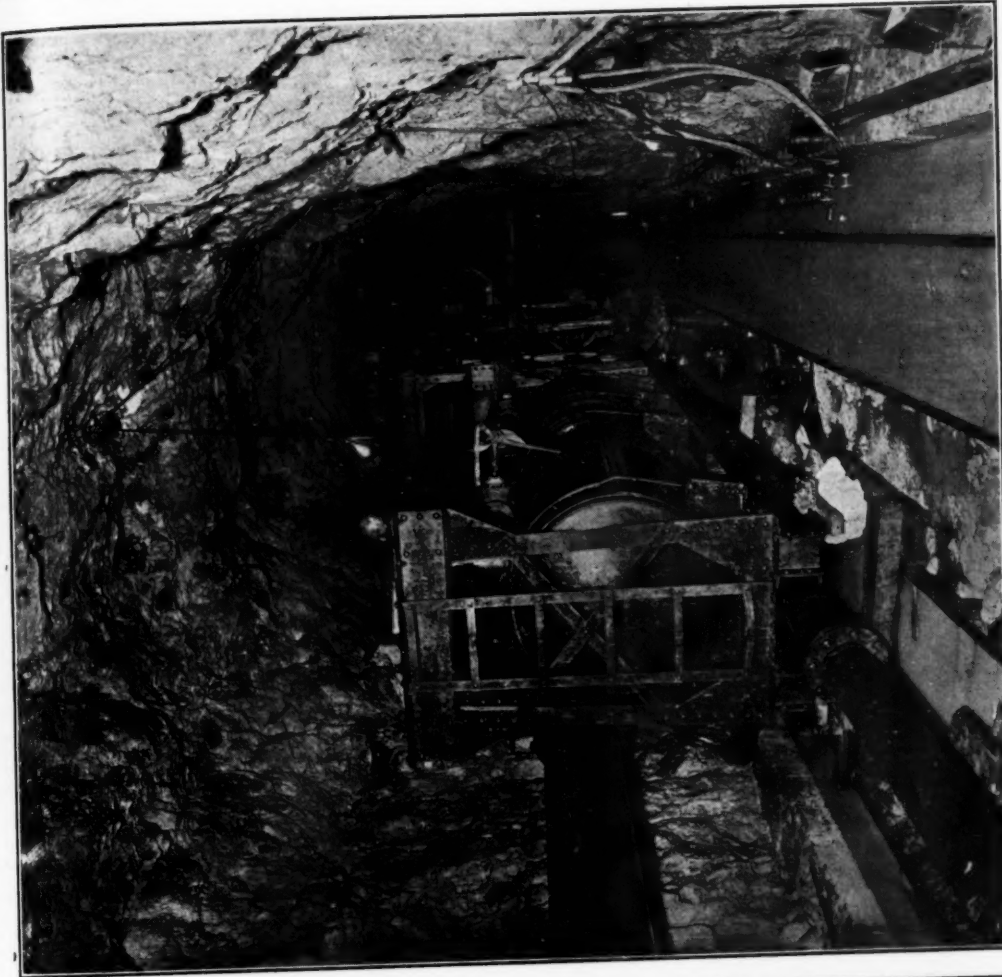
About 60 feet is lined per day in two shifts; at the same time 20 to 22 feet is being mined in the same drift. This simultaneous working is the chief element in hastening the time of completion of the tunnel fully a year before the scheduled time. Four concreting plants are at work in the tunnel.

In the western portion of the tunnel the rock blasts into larger lumps and there remains unblasted just enough rock to line the $3\frac{1}{4}$ miles between the Lincoln avenue and Mayfair shafts. Therefore a rock crusher, the only one used in the tunnel, is placed below the Lawndale shaft. The oversize rock from a concrete outfit east of this shaft is passed through this crusher and fed to a concreter lining the tunnel between Lawndale and Mayfair.

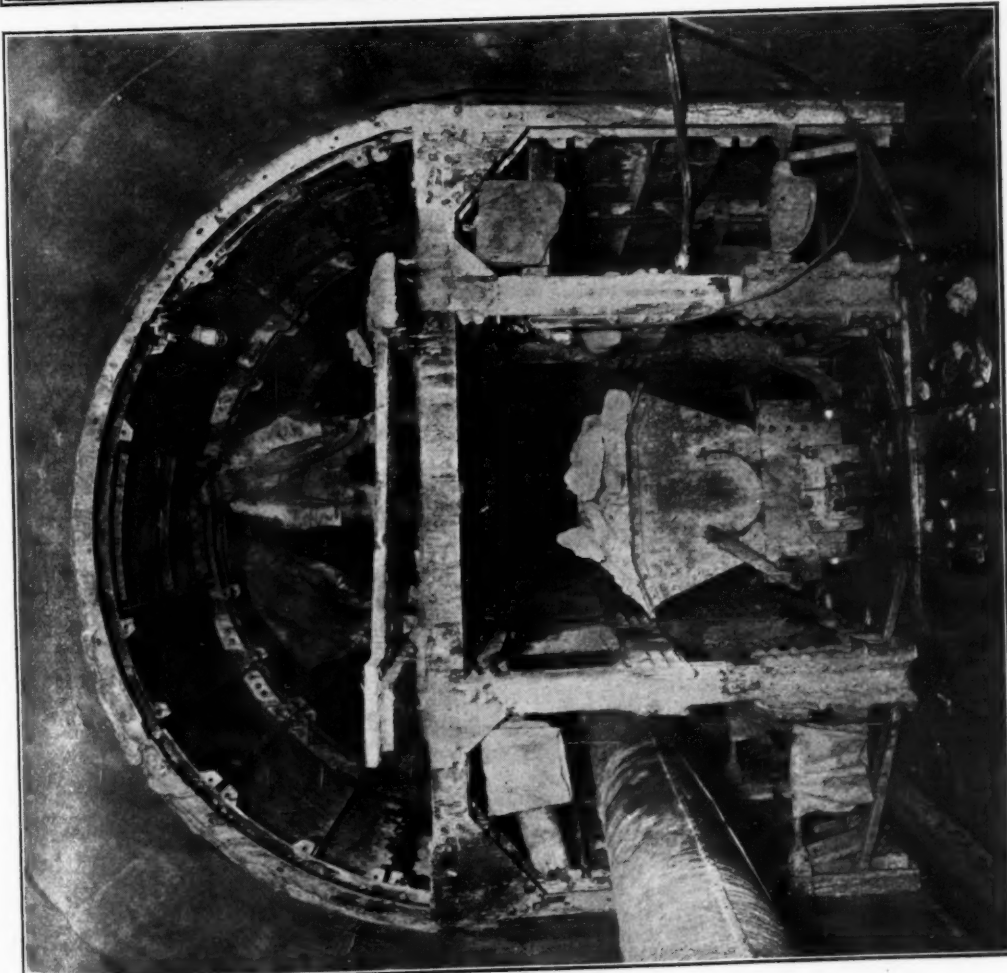
The lined and finished portions of the tunnel are smooth and dry. The concrete is forced behind the forms with such pressure as to be very dense and therefore substantially leakproof. Naturally none of the floor of the tunnel has yet been put down, since this would interfere with the use of the tracks, which is required as long as blasting is going on. The floor will be slightly concave and will be concreted after practically all other work is done. This concreting will require no forms.

All of the work on the Mayfair pumping station so far has been done by the city on the day labor plan and it is expected that this plan, which has been so successful, will be continued for practically all the remaining work. This station will contain seven steam-driven pumping engines. Four of these will each have a rated capacity of 25,000,000 gallons per day; three will have a capacity of 15,000,000 gallons per day and will operate at higher pressure, serving the high lying districts a few miles west and northwest of the station.

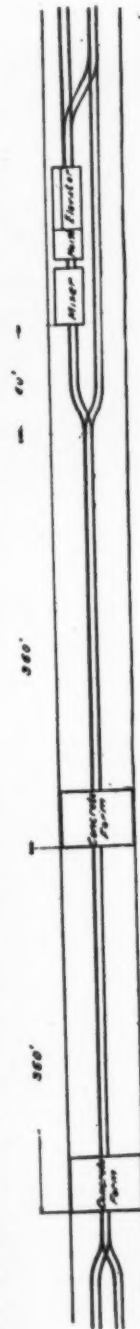
Connecting with the shaft near the present terminus of the Wilson avenue tunnel at a level about 60 feet below street surface are two branch tunnels leading to



DISCHARGING END OF CONCRETE MIXER.
Tanks in front part of machine are air reservoirs. One track is left entirely unobstructed.

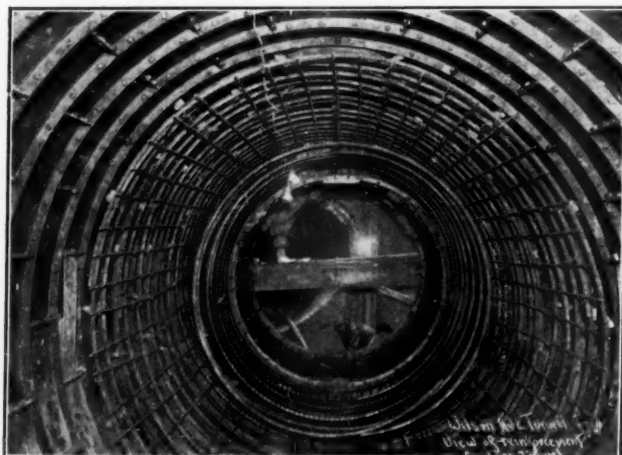


TAIL, END OF CONCRETE FORM, SHOWING PORTION OF LINED TUNNEL.
Also average size rock being hauled to shaft through middle of form.



TRACK LAYOUT AT FORMS AND AT CONCRETE MIXER.

screen shafts and connected at the north by the suction tunnel from which the pumps will draw their supply. This series of tunnels forms a continuous loop. Each of these tunnels is 8 feet in diameter and was excavated entirely in hard clay. The screen tunnels were alternately mined and concreted in six-foot sections. The suction tunnel was entirely excavated before it was concrete lined. Steel lining plates were used and within these heavy reinforcing rings were placed just before the concrete lining was put in. This special reinforcement was used to withstand the great pressure from the nearby foundations of the pumps and pump room walls.



REINFORCED SECTION OF TUNNEL. DUG IN CLAY DIRECTLY UNDER PUMP ROOM.

The work on these foundations is rapidly proceeding night and day. It involved excavation of a pit 240 by 120 feet, the larger part of which is about 45 feet deep, the pumps setting far below street surface. On account of the large number of reinforcing rods placed only two inches apart, gravel was used for the concrete, since use of stone from the adjoining rock pile obtained from the main tunnel would have required installation of a crusher.

At the other end of the main tunnel, the new intake crib also incorporates some very interesting new features. The depth of the lake is about 35 feet at this point. In former crib construction it was the practice to build a solid timber foundation 6 feet thick, float it out to the site and sink it. Upon this a timber framing was built about the well and this was surmounted by concentric steel shells to several feet above water, the space between the shells being filled with rock and concrete, forming the foundation for a stone protecting wall and keeper's house. This produced a topheavy structure subject to considerable rocking in violent storms. When sinking the shaft, considerable difficulty was also met in cutting through the solid timber bottom.

On account of the disadvantages of this type of construction, together with the high cost of timber, it was decided by the city engineers to develop a new type of construction in which timber would be eliminated. This new design includes two concentric steel shells, each $\frac{3}{8}$ inch thick; the outer one being about 90 feet in diameter and the inner one 40 feet. Joining the shells are the intake ports, eight in number, also numerous steel bracing members. These shells were built on land, the ports closed by bulkheads, and flotation chambers built between the ports. These chambers and closed ports served to give the structure buoyancy when it was launched and floated out to the site, it resembling a vessel circular in shape and without bottom. Cutting edges on the bottom of the shells served to seal them

in the bed of the lake when the structure was sunk by flooding the ports and chambers. Portions of the annular space between the shells were filled with concrete and the rest with rock. The inner shell was pumped out and sinking of the shaft began without difficulty. This crib construction is very much more substantial than that formerly used and probably also cheaper. The shaft proper reaches up to 10 feet below the water surface, leaving the entire top of the shaft unobstructed for fish screens.

The cost of the crib and 2,000 feet of tunnel just referred to, which is being done by contract and constitutes Section I, is to be a little under \$500,000. The work on Sections II and III being done by the city will bring the entire cost of the Wilson avenue tunnel to about \$3,500,000. This is considerably below the estimated total cost. It was estimated that the cost would be about \$75 per lineal foot, exclusive of engineering and inspection. The average of all the bids received for Section II was \$78.88 per foot. The lowest bid on this section was \$68.20 per foot, including engineering and inspection. The average actual cost of both Sections II and III being built by city day labor has so far been found to be \$61.48 per foot, including engineering and inspection. The cost of the Mayfair pumping station will be about \$1,375,000. All told, the total cost of the entire project, including the crib, main and auxiliary tunnels, and pumping station will be well within the \$5,000,000 estimated. The cost of the entire work is being met from the surplus in the city's water funds.

This municipal undertaking is being executed under the general authority of the Department of Public Works of the City of Chicago, of which W. R. Moorhouse is commissioner. In charge of the engineering design and general supervision is John Ericson, city engineer and head of the Bureau of Engineering. Henry W. Clausen, engineer of water works construction and head of the Construction Division of this bureau, is in actual charge of the construction work and credited with originating many of the new construction methods that make this project distinctive.

LOS ANGELES AQUEDUCT REPORT.

Municipal officials for some years have read with interest the progress in the construction of the great enterprise the city of Los Angeles had under way in the building of its Los Angeles aqueduct, designed to carry a flow of 260,000,000 gallons daily from the heart of the Sierra Nevadas to the city's gates.

The Municipal Journal at quite frequent intervals has published descriptions of various details of this monumental work. The final report, which covers all phases of the enterprise and which, we understand, has been in course of compilation for several years, is on the eve of publication. Because of the interest it will create among our readers, we publish the following letter received from R. F. Del Valle, president of the Public Service Commission of Los Angeles, which was in charge of the construction and now is of the operation of the system.

May 24, 1916.

Mr. A. Prescott Folwell,
Editor, Municipal Journal,
50 Union Square, New York City.

Dear Sir: The Los Angeles Department of Public Service will publish in the near future a final report on the construction of the Los Angeles aqueduct, a volume which we believe will be of great interest and value to all engineers, city officials, contractors or those interested in the economic description of a great enterprise.

As an official publication it contains authoritative information on all the various features of a municipal project requiring ten years for its consummation and an expendi-

ture of \$30,000,000 to finance it. Opening with a history of the undertaking from inception to completion, the book continues with chapters on sanitation studies, organization of forces, cost keeping methods, tufa cement manufacture, conduit excavation with steam shovels, tunnel boring and lining, reservoir building, fabrication of the great steel siphons, automatic weir gates, etc., etc.—in short, the book is a complete exposition of the many different hydraulic problems which were encountered and overcome on one of the greatest hydraulic enterprises ever undertaken. Cost data are to be found in profusion.

The volume will comprise approximately 350 pages, stoutly bound in serviceable cloth binding, with over 100,000 words of text, 86 half and full page illustrations and 45 line prints of maps and engineering structures. The cost of printing alone quite prohibits the possibility of free distribution. The Board, however, realizes its value to engineers and municipal officials, and to this end has set a price at which it may be obtained of \$1.95 per volume postpaid. This does not pay the cost of printing. The Board derives absolutely no profit from the sale of the volume and the only interest in the book's distribution is the desire to place it in the hands of those who will appreciate its value. The book will be issued only on subscription. Printing will be started about July 10th and after that date no further orders will be received. Orders should therefore be made immediately. Remittances should be made payable to the Los Angeles Department of Public Service, 645 South Olive Street, Los Angeles, Cal.

Thanking you for any publicity that you may be able to give the above, I am,

Very truly yours,

R. F. DEL VALLE,
President.

STRENGTH OF UNSUPPORTED BRICK PAVEMENT.

In Wayne County, Ohio, there is about 50 miles of brick pavement on the county roads. A section of this a short distance west of Wooster, the county seat, is on a road skirting a small stream known as Killbuck Creek. Following storms last spring, the creek rose and the water overflowed the road for several hours. When it receded it was found that the embankment supporting the road had been eroded for several hundred feet. For a distance of sixty feet the concrete base of the pavement had been undermined and had fallen away, but the brick surface remained unbroken, as shown in the photographs. The under side of the brick was bared for sixty feet and a maximum width of six feet, yet an automobile with passengers was supported on the side of the road over this opening without disturbing the surface in the least. Moreover, in preparing to refill the embankment, large boulders were brought and dumped upon the pavement and then rolled over the edge into the hole, without disturbing a single brick.



WASHOUT NEAR WOOSTER, O. REFILLING BEGUN.

The county engineer, Randall Barrett, to whom we are indebted for this statement, says that this road was built with grouted joints and in conformity with all details of good construction, under his personal supervision.

STANDARD UNITS FOR PAVING AND SEWERAGE

Desirability of the General Use of Standard Units in Connection With Municipal Improvements—Units Advocated by American Society of Municipal Improvements.

To the majority of city officials and taxpayers the one thing most readily understood about public work is its cost. Even engineers, to whom the technical and construction sides of such work are those of most interest, must also consider cost, and consider it most carefully. Not only because the closeness of agreement between their estimates and the actual cost is taken by many citizens as a measure of their ability; but much more because of the real practical importance of such close approximation.

The importance of close estimating is very apparent. If an estimate is excessively high it may cause the voters to defeat a proposed improvement at the polls. If it proves to have been too low the voters will be suspicious of all future estimates and may for that reason reject future improvements. Also bond issues based upon low estimates place the city administration in an embarrassing position.

Estimates must be based upon the cost of past work—I know of no other reliable method of estimating. And

*Abstract of a paper before the Seventh Annual Conference of Mayors and other officials of the Cities of the State of New York, by A. Prescott Folwell, Chairman of Committee on Standard Forms of the American Society of Municipal Improvements.



UNDER SIDE OF BRICK PAVEMENT, SHOWING CONCRETE BASE AND SAND CUSHION.

this means that we must have exact knowledge not only of how much was spent, but also of what was obtained for it. Unit costs are necessary for making estimates.

The cost of public work is one thing which any taxpayer feels that he can understand, however hazy his ideas may be concerning the engineering features. When, therefore, he learns that some other city is getting a certain kind of pavement at considerably less cost than his own, or that he is assessed more per front foot for a pavement laid on his street than his neighbor is for the same kind of pavement laid on another street in his city, he wants to know why, and is entitled to a clear and definite answer.

There always is an answer, and it is generally a perfectly valid one; but the mere fact that explanations and excuses are necessary is apt to arouse suspicion, especially if there is anything indefinite about the explanations given. How much better if explanations were unnecessary; or if, when required, they could be made so clear and concise as to convince any man of average intelligence!

That taxpayers in many cities have reason for asking such questions, and that the data obtainable in such cities are not at all adequate as a basis for the preparation of reliable estimates are illustrated by the accompanying table. In reply to inquiries made this year and last by the paper of which I am editor, several hundred city engineers furnished figures giving the average costs to their cities of each of the various kinds of pavement. From the figures furnished for New York state I have selected those shown on the accompanying table. (Figures equally as remarkable could be cited for a dozen other states.)

COST OF "PAVING" IN SOME NEW YORK CITIES.					
Brick Paving.			Sheet Asphalt.		
	1915	1914		1915	1914
Dunkirk	\$1.39	Geneva	\$1.25
Jamestown	1.62	\$1.62	Schenectady ...	1.49	\$2.00
Plattsburg	1.65	1.65	New York	1.68	1.53
Olean	1.85	1.75	Albany	1.74	2.14
Salamanca	1.89	2.25	Syracuse	1.99	1.87
Corning	2.00	2.04	Troy	2.23	2.45
Hornell	2.10	2.03	Buffalo	(3.53)
Albany	2.11	2.04			
Binghamton ...	2.19	1.98	Average (not in-		
Lockport	2.30	2.25	cluding Bu f-		
Little Falls ...	2.30	2.65	falo)	\$1.73	1.99
Elmira	2.32	2.32			
Oswego	2.35	2.43			
Utica	2.35	2.36			
Syracuse	2.37	2.05			
Port Jervis ...	2.45	2.46			
Niagara Falls ..	2.50	2.62			
Auburn	2.75	2.45			
Troy	2.85	2.73			
Buffalo	(3.29)			
Average (not in-					
cluding Bu f-					
falo)	\$2.21	\$2.21			
Maximum	2.85	2.73			
Minimum	1.39	1.62			

Take sheet asphalt, for instance. The method of constructing this is standard, and there should be no great difference between the costs of it in several cities in the same section of the country. But in 1915 this pavement cost Geneva, N. Y., \$1.25 per square yard and Troy \$2.23. It looks as though the Troy taxpayers had some explanation coming to them.

Syracuse paid \$1.87 in 1914 and \$1.99 in 1915—an increase of 12 cents. But Albany paid \$2.14 in 1914 and only \$1.74 in 1915—a decrease of 40 cents. What is Syracuse's explanation?

Or take brick pavements. In 1915 Dunkirk laid these

for \$1.39 a square yard, while Troy paid \$2.85—more than twice as much. Syracuse paid \$2.05 in 1914 and \$2.37 in 1915—an increase of 32 cents; while Salamanca paid 36 cents less in 1915 than in 1914, or \$1.89 as compared with \$2.25. I have no figures for Buffalo for 1915, but she reported for 1914 a cost of \$3.29 for brick pavement—nearly two and a half times as much as Dunkirk; and \$3.53 for asphalt, or nearly three times as much as Geneva.

WHAT IS "PAVING"?

One thing is sure—there was *not* actually all this difference in costs, and it is evident that these figures are for some reason not comparable—that the thing which Buffalo calls paving is not the same as that to which Dunkirk applies that name. And what Syracuse did for \$2.05 in 1914 was not, I believe, the same as that for which she paid \$2.37 in 1915.

As Buffalo is the most "horrible example," let us see what she paid \$3.53 for in 1914. It included, beside the pavement, some grading, setting new curb, laying a drain, probably other general work like resetting manhole heads, and a 10-year guarantee. Another city, not in this state, has gone far ahead of this however, for she includes under the head and price of paving, all excavation, curb, storm sewers, adjusting manhole heads, building catch basins, and even grading the private property along the street. I see no reason why that city did not include lighting standards, wire conduits, shade trees and other street accessories, except that they perhaps were already in.

All these things are street improvements, but they are not *paving*, and to call them so seems absurd.

Moreover, to explain that a certain cost includes grading and setting curb does not help us to compare this cost with another—it only shows that such comparison would be useless, unless we know just what part of the cost was to cover each of the non-paving items.

The total cost of these non-paving items may be considerable. For instance, in 1915 Walden, N. Y., laid a brick pavement which cost \$1.84 for the pavement and foundation, but \$2.34 if excavation and other improvement items be included. This is an average and not an extreme case. In some cases the additional items will amount to even more than the paving.

It may be claimed by some cities that under their methods of assessment the property owner is to be assessed for the *total cost* of the improvement, and therefore this is the cost desired. This is all right, if you call this "street improvement" and not paving. But even in this case, itemizing costs would be of great value; and if the cost were itemized, a school boy could get the total cost per front foot in five minutes by a little multiplication and addition; while if the bids or records give only the total cost, not even a paving expert can "unscramble the eggs" and tell what the paving alone cost.

Some prefer a "lump sum" bid, so that no extras can be worked in on the payment. But the same end can be reached by receiving itemized bids, and adding a "residual item" clause, asking a price for all work necessary to complete the job according to plans and specifications but not covered by the other items.

ITEMIZING BIDS AND COSTS.

The advantage of having bids or costs for each item is, I think, apparent with a moment's thought. If we know what it costs each city in the state or in the country to lay a square yard of standard brick pavement, exclusive of excavation, curbs or any other items, then we have figures which are directly comparable. We can tell whether neighboring cities really did get more for a dollar than we did. We can show the taxpayers, without dubious explanations, that they are getting more for their money this year than they did last. If A complains

that his street improvement assessment is higher than that of B who lives on the next street, we can show him that it is because there was more grading to be done on his street, or more curb to be set, and that the paving itself does not cost him a cent more. The probability is, however, that the facts will appear so plainly in the published figures that we will not need to explain at all.

In the previous remarks, paving has been used for illustration, but the same ideas apply to sewer construction or any other kind of public work. It is only when costs are itemized that cost records of such work will be of value for making future estimates, or comparisons with costs of previous years or of other cities.

Such itemizing is essential for obtaining efficiency and economy. How can we expect to cut down costs if we do not know what items are the high ones? Can a manufacturer know how to increase his profits if his accounts show, not what individual items cost him to produce and market, but only his total profit or loss for the year?

STANDARD UNITS.

If the only aim is to compare costs in your own city and on work done by you individually, then each might select his own units for measuring and expressing quantities of work. But how much more valuable each one's cost records would be if he could compare them with those of all other cities and of previous administrations in his own city! This means that he and all others should use the same units. That when he says "a square yard of asphalt pavement" he means exactly the same thing as every other man who uses the term.

A very considerable number of cities do keep their records and receive their bids itemized as described; but they find the undoubted value of this is lessened by the fact that not all use the same units for measuring the work done, or use them with exactly the same meaning.

To remedy this condition, the American Society of Municipal Improvements has, after two or three years' consideration, adopted a few of the more important units for paving and sewerage, which it recommends as standards for universal use. This society numbers among its members most of the leading city engineers and consulting engineers on municipal work, and it is to be presumed that the units which it adopts will be those best adapted to the purpose which seem practicable at this time. The standard paving specifications which the society has prepared are now generally accepted as the standards for the country, and it hopes that its standard units also will be generally adopted. When each standard kind of pavement is laid by everyone according to a standard method and measure with a standard unit, we will then be able to make comparisons which will have a real value—which we are not able to do now.

Possibly some may not think these units so satisfactory as those which they are now using. Perhaps they admit the desirability of a standard, but think their unit should be adopted. But the general adoption and use of even inferior standard units would be a great improvement over the present condition of no man understanding just what another means. And that the units here recommended are far from being inferior would seem to be guaranteed by the high standing of the society which has adopted them.

The A. S. M. I. units for paving and for sewer work are as follows:

A. S. M. I. STANDARD UNITS.

If these units are used, a statement to that effect in a report or description, without further explanation, gives certainty of meaning to the figures.

STREET PAVING.

PAVEMENT: The wearing surface down to the base, if any. Includes cushion or binder course, but not concrete, macadam, or other base. If base is included, describe as "pavement and _____ inch concrete or macadam base." In the case of macadam or concrete pavement, the term includes all down to the earth foundation. *Unit,*

the square yard, giving material and thickness. Ex.: 1524 sq. yds. of 3 in. asphalt pavement.

BASE: The concrete, macadam or other material placed under the pavement to distribute the load on the subgrade. *Unit, the square yard, naming thickness and material. Ex.: 1524 sq. yds. of 6 in. concrete base.*

EXCAVATION; EMBANKMENT: All material removed before laying base, curb or sidewalk; or all material added, up to base, curb or sidewalk. *Unit, the cubic yard, naming material. Ex.: 600 cu. yds. of earth excavation.*

CURB: Complete construction of new curb, except excavation or embankment. **RESETTING CURB:** Same, except furnishing of curb stone. *Unit, lineal foot, stating (in inches) depth and mean width of curb, and material. Ex.: 952 ft. of 7 x 8 granite curb reset; 750 ft. of 6 x 16 concrete curb.*

GUTTER: Same as curb. *Unit, square foot, stating thickness and material. Ex.: 1428 sq. ft. of 6 in. concrete gutter.*

SIDEWALK: The artificial wearing surface, not including excavation or embankment, nor base of cinders or other material, if any. *Unit, the square foot (or square yard, if preferred) giving average thickness and material. Ex.: 1720 sq. ft. of 6 in. concrete sidewalk.*

SIDEWALK BASE: Cinders or other material placed under sidewalk. *Unit, the cubic yard, naming material. Ex.: 122 cu. yds. of gravel sidewalk base.*

SEWER CONSTRUCTION.

CONSTRUCTING SEWER: Excavating trench (except rock and street pavement), furnishing material for and constructing or laying the sewer barrel (not including branches, manholes or other appurtenances, special foundations, etc.) and backfilling (not including relaying pavement). Excavation of rock, sheathing left in trench, and removal and replacing of pavement paid for extra. Depth of excavation is measured from street surface to invert of sewer, and classified by two-foot intervals. *Unit, the lineal foot (measured along the entire length of the sewer, including manholes and specials), naming size of bore and material of sewer, and depth. Ex.: 10 in. vitrified sewer, 950 ft. 8 to 10 ft. deep; 630 ft. 10 to 12 ft. deep.*

BRANCHES: Y or T branches inserted in the sewer; the price paid to be additional to that paid for the sewer in which the branch is inserted.

MANHOLE: The total structure, including bottom and top casting, steps, etc., additional excavation and backfilling. Standard to be taken as 6 feet deep, and depths exceeding this to be given in additional feet depth. Price is in addition to that paid for sewer (measurement for which includes manholes, as stated above). *Unit, manhole of standard depth, giving bottom diameters in feet; and feet of additional depth. Ex.: 7 manholes 3 x 4½, and 22 ft. additional depth. (This means that the sum of the depths was 64 ft., and the average depth was 9 1/7 ft.)*

REPLACING PAVEMENT: Grading top of trench back-fill, putting in pavement foundation (if any), and laying wearing surface (replacing any material damaged in removing same). *Unit, square yard, naming kind of pavement. Ex.: removing and replacing 726 sq. yds of brick pavement.*

If each mayor would direct the departments which have charge of the public works of his city to adopt and use these units, and with the meanings here given to them, then each city will know just where it stands in regard to paving and sewerage costs, and whether it is getting as much for its money as its sister cities who use the same units. Then such inconsistencies and meaningless figures as are shown in this table will be a thing of the past; and a very important step will have been taken toward greater economy in public work—that of being able to recognize it when we see it, and to prove it when it exists.

OVERHEAD WIRES IN STREETS.

Removal of Wires and Poles from Streets, With Special Reference to the Prohibition of New Overhead Construction.

By Andrew Linn Bostwick.

It is not the intention here to attempt to treat fully of the subject of removal of poles and wires from city streets. Only three points in this connection are considered, as follows:

1. Municipal regulations prohibiting new overhead construction.
2. Provisions for removing present overhead construction.
3. Progress of removal to date.

The information below is based on communications received from seventeen of the largest cities in the United States in March, 1916.

As to the first point, the investigation has revealed the fact that there is practically no one of the cities under consideration that entirely prohibits the stringing of new wires and poles. In practically all of the cities under consideration there may be no new wires and poles in

*Municipal Reference Librarian, St. Louis Public Library.

City.	New wires and poles.	Removal of present wires and poles.	Progress of work.
New York	None without permission. None allowed in conduit district.	By negotiation, but city may order removal at any time.	All Manhattan, and much in other boroughs.
Chicago	No general law. Handled in franchises and by co-operation with companies.	May be removed from paved streets.	Removed from all places where they would be objectionable.
Philadelphia	No law.	No law.	Removed in business district.
Boston	None in underground district, elsewhere by permission.	5 miles of streets per year.	Removed to large extent.
Cleveland	No law to prohibit except in conduit district.	Each company 14 miles a year, choosing the district.	
Baltimore	By permit—usually allowed if outside conduit district.	By order of Electric Commission.	Large area in built-up districts of city.
Pittsburgh	None in conduit zone—elsewhere by permission.	No particular provision.	
Detroit	None within ½ mile of city hall; elsewhere by permit.	Largely by initiative of companies. No legislation necessary so far.	½ mile of city hall, and elsewhere to some degree.
San Francisco	Companies operating before 1911, without permit; since 1911, after permit; none in underground district.	2½ miles of streets per year.	22½ miles.
Milwaukee	Allowed except in downtown district.	When streets are repaved.	
Cincinnati	No law prohibiting.	On order of city when found necessary. No specific law.	
Washington	Electric light and power wires prohibited in fire limits.	Must be removed in fire limits, generally speaking.	All telegraph in fire limits; almost all telephone in fire limits; almost all lighting in fire limits.
Minneapolis	No specific law.	Certain blocks each year by order of Council.	54 miles.
Jersey City	Commissioners must authorize.	Commissioners may order removal.	
Kansas City (Mo.)	Allowed by ordinance; others by permit from Board of Public Works; none allowed in underground section.	Must be removed from certain downtown area.	Downtown section about completed.
Seattle	No new poles in underground district.	Certain district must be finished in 3 years (business district).	Business district about completed.
Los Angeles	Prohibited in conduit district; elsewhere by permit.	From 2 miles of streets per year, as selected by Council.	

that section of the city in which conduits have been built. This, of course, is to be expected. As a general thing, however, the laws do not prohibit new wires and poles in other parts of the city. From Philadelphia, Cincinnati and Minneapolis the information is to the effect that there is no law relating to the construction of new wires and poles. In the other cities the general practice is to allow no new wires and poles within the conduit district, and to allow them nowhere else in the city unless a permit therefor shall have been granted. In San Francisco certain companies, namely, those which were in operation before 1911, may erect new poles and string wires outside the conduit district without any permit at all.

As to the methods by which present wires and poles are removed, there is a diversity of practice, as will be seen by the tabulation in this report. It should be noted that in several cases the work of removal has been entirely or in part by agreements between the city and the public utility companies. In other cities there are laws which require the removal of poles and wires on a certain number of miles of streets per year. In Milwaukee work of this sort must be done when a street is repaved. In some cities, as New York, Chicago, Baltimore, Cincinnati and Jersey City, the municipality has the power to order removal of wires and poles at any time.

As to the progress of the work to date, it may be said in a general way that in most of the cities under consideration the poles and wires have been removed in the congested or business districts. In New York the work has been completed in the Borough of Manhattan, and

a good deal has been done in other boroughs. In Washington the territory within the fire limits is practically free from poles and wires. The reports indicate that in New York and Washington the work has reached a much more advanced stage than it has elsewhere.

GARBAGE DISPOSAL IN MINNESOTA CITIES.

Several Minnesota towns and cities dispose of their garbage by feeding all or a part of it to pigs. Among these municipalities are Austin, Fairmont, Faribault, St. Cloud, St. Paul, South St. Paul, Wabasha, White Bear Lake and Winona. Chisholm, Duluth, International Falls, Minneapolis and Virginia dispose of their garbage by incineration. The Chisholm plant handles about 60 tons per month and the Virginia plant 200 tons, while in 1914, the Minneapolis plant handled 20,543 tons. In Chisholm the village collects the kitchen garbage once a week free of any charge, using water-tight garbage cans and water-tight wagons with stop cocks. The wagons are flushed out after every load. St. Cloud collects garbage three times a week at a charge of 25 cents to householders in the residence districts and free in the business districts. Covered steel wagons are used, which are flushed out once a week. The village of Long Prairie pays a man with team about \$50 a month, and collections are made from April to December. No particular kind of receptacle is required for the garbage, which is hauled to the village dump and burned.

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JUNE 8, 1916

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Society Conventions.

At this season of the year almost every class of city official is invited to attend a convention of some organization or organizations, the purpose of which is to discuss subjects with which his department or office is specially concerned. Some officials attend these conventions at their own expense, others at the expense of the city. Where the latter is the case, the local papers, especially those of opposite political faith, are apt to refer to the attendance of the official at the conference as a "junket," the implication being that he goes solely or chiefly for his own pleasure and that the city receives no return for the expense.

Whatever may have been true years ago, we believe that at the present time there are very few conventions of municipal officials which are not devoted almost exclusively to serious purpose and which do not imbue in any official who attends a fund of information, enthusiasm and good intentions which should result in a return to the city much more than compensating it for the traveling expenses of its representative.

Take for instance the convention of Mayors and Other City Officials of New York State held last week. Those attending this convention found their time occupied by the reading and discussion of papers continuously, from Wednesday noon until Friday noon, morning, afternoon and evening sessions; the only break in the monotony

being luncheon between morning and afternoon sessions of two of these days, at which they were entertained by city organizations. This week the American Water Works Association is attending a convention in New York, and here we find water works superintendents attending seven sessions for the discussion of water works subjects.

From these illustrations, which are no exceptions, it must be evident that there is a serious purpose behind these organizations and their conventions, and we believe that the great majority of those attending them are fully repaid for their attendance, and repay their cities for any expense incurred, in the information which they receive and will turn to the use of the city, and in the inspiration and enthusiasm for better results which they derive from personal contact with officials from other cities.

A. S. M. I. Standard Units.

We have previously referred to the standard units adopted by the American Society of Municipal Improvements and which it is the aim of that society to have adopted generally in connection with municipal work throughout the country. The committee in charge of this branch of the society's work has recently sent a circular letter to city engineers and street officials of all the cities and larger towns of the United States, accompanied by cards containing the units and their definitions, requesting the officials to use these standard units because of the general advantage which such use will give to all municipalities. The units and their definitions, and a brief statement of the advantages of adopting standard units, were given in a paper before the mayors and city officials of New York State, which is abstracted elsewhere in this issue.

It is gratifying to learn that these standards are being received quite cordially throughout the country and that there is every probability that they will be adopted by a very considerable percentage of the municipal officials of the country. The Conference of Mayors and City Officials of New York State has appointed a committee to consider the matter with a view to recommending the units for adoption by all the cities of the state. The adoption of them is also to be considered by the Montana Institute of Municipal Engineers, they have been adopted as the official units by some of the cities of the country individually, while scores of city engineers have written to the committee stating that they will use them in all future work.

In addition to municipal officials, a number of organizations of manufacturers and dealers in paving materials have indorsed or, it is believed, will indorse their use and will recommend them to all cities with which they have dealings. The Granite Paving Block Manufacturers' Association within the past week has officially adopted them and "will join the American Society of Municipal Improvements in urging engineers, city officials, contractors and manufacturers to adopt and use these standard units for street paving." The secretary of the National Paving Brick Manufacturers' Association is "fully in accord with this effort of the society and will do all I can to encourage the employment of the units as set forth and I trust that everyone else will do likewise." The secretary of the Southern Paving Brick Manufacturers' Association writes relative to the standard units: "I think you have gotten them up in concise and systematic form and feel sure that our directors will approve same at our next meeting to be held early in June. You may count upon our co-operation in every way."

A great many of those who have written to the committee state that they are already using units very similar to those of the society and that they will make such slight

changes in their practice as is necessary to conform exactly with the society's units. This is gratifying to the society, since its aim was not to establish new units, but rather to put on a strictly standard and scientific basis those units which were in most common use and at the same time met, with any degree of approximation, the requirements of a standard unit. The less the change which the majority of cities would have to make in their practice in adopting these units, the greater the probability of their general adoption.

With this excellent beginning toward the general acceptance of these units, it is to be hoped that other cities and municipal officials will fall into line and that the very near future will see all of the progressive cities of the country using these units for receiving bids and giving prices or otherwise describing municipal public work.

Only a few units have yet been put forward by the society, but these are those which are considered the most important connected with the two branches of municipal work which receive the greatest expenditures—paving and sewerage. With these principal units adopted, the society will endeavor to extend the list to the other less important ones, until in time all municipal public improvements may be described and their prices given in terms which will make the work of all cities directly comparable and which are of definite meaning.

MOTOR TRUCKS AND STREET GRADES

Method of Computing Length of Level Detour Which Truck Can Travel Economically to Avoid a Given Grade—Speeds on Varying Grades.*

While in laying out a system of streets in a hilly country, it is impossible to avoid grades, there will often be two sections separated by a hill or ridge, which may be connected either by a street running around the hill or by a more direct one over it. The former will necessitate an increase in length due to the indirect course and the question arises as to whether the lower speed and the reduction of the load required on the steeper grade of the direct route are more than offset by the easier grade of the longer route. Assuming such conditions as may be encountered in actual practice, the extra distance that can be traveled economically may be computed.

In making these calculations, we will consider only motor vehicles; and, since practically all pleasure cars are so high-powered in comparison to their weight that they are able to climb grades of 8 or 10 per cent at the same speed that it is safe to travel in city streets, we need to consider only commercial vehicles.

In computing the extra distance that the truck might travel economically, we will assume on the direct route a hill one mile long, paved with granite blocks. We will consider the effects of grades of 3 per cent, 6 per cent and 8 per cent. We will assume that the descending grade will balance in time etc. an equal distance on the level.

The traffic resistance due to granite block pavement varies according to the condition of the pavement, but an assumption of 40 pounds per ton, or 0.02, is fair. Resistance due to grade will vary with the per cent of grade, but will be 0.03 of the total weight for a 3 per cent grade, 0.06 for a 6 per cent grade and 0.08 for an 8 per cent grade. The total resistance will be the sum of these two resistances and will be 0.05 of the weight for the 3 per cent grade and 0.08 and 0.10 respectively for the 6 per cent and 8 per cent grades. We will consider the detour street to have the same pavement, or any similar one offering the same tractive resistance. (It might

be easier to climb a 3 per cent grade than to use a heavy earth road on the level.)

We may assume as an average truck, a 2-ton truck, weighing 9,600 pounds fully loaded; and a 5-ton truck, weighing 18,000 pounds fully loaded, as a type of the heaviest motor truck. A typical 2-ton truck as made at the present time has a 4-cylinder motor of 4-inch bore and 5½ inch stroke. Under the standard formula for horsepower

$$H P = .4 B^3 N = 25.6$$

where B is the diameter of the cylinder and N the number of cylinders. Gear reduction ratios vary for the different makes of trucks, but the following may be assumed as an average gear ratio (crank shaft to rear wheels): High speed, 7¼ to 1; intermediate, 13 to 1; low and reverse, 30 to 1. Wheel diameter for this size of truck is quite uniformly 36 inches. Where road conditions permit the engine to attain full speed permitted by the governor, speed on high gear will be about 15 miles per hour, on intermediate 8.5 and on low 4 miles per hour. Average speeds will not, of course, be as great, but may be assumed at 10.5 miles for high speed, 6 for intermediate and 3 for low speed. Under heavy load, this speed would be reduced somewhat.

We then have for the 2-ton truck:

$$\begin{array}{ll} B \text{ (bore of cylinder)} = 4 & W \text{ (total weight)} = 9600 \\ S \text{ (stroke)} = 5\frac{1}{2} & D \text{ (wheel diameter)} = 36 \\ & R = \text{gear Ratio.} \end{array}$$

For a 3 per cent grade, the tractive resistance (TR) = 0.05

In order to find R, the gear ratio necessary to climb a given grade under full load, we may use Myers' formula for the tractive force:

$$TF = \frac{28.2 B^3 SR}{DW}$$

Since TF must equal the tractive resistance, TR, in order to climb the hill:

$$\begin{aligned} .05 &= \frac{28.2 \times 4^3 \times 5\frac{1}{2} \times R}{9600 \times 36} = \frac{155.1R}{21,600} \\ R &= \frac{1080}{155.1} = 6.9 + \end{aligned}$$

Since the high speed gear ratio is 7¼ to 1, the truck could just make the hill on high speed, though the speed would probably be cut down somewhat below the average mentioned above, since under heavy load motors will not fully develop high speed. Consequently there would be little advantage in making a detour to avoid a 3 per cent grade.

In calculating for the 6 per cent grade, the same method would be used, and solving, R is found to be 11.2. This necessitates dropping into second speed, where the average speed would be about 6 miles per hour. At this rate it would require 10 minutes for the ascent, during which time the car could travel on high speed about 1¾ miles on the level. It would therefore appear to be economical to make a level detour which would be ¾ of a mile longer than the hill route; and possibly more, considering the extra strain and wear on the machine.

Following the same method for the 8 per cent grade, R is found to be 14 and the driver would be obliged to use low speed (the gear ratio for second speed is 13 to 1) and the speed would be about 3 miles per hour. At this rate it would require 20 minutes to climb the hill, during which time the truck could make on the level, at 10.5 miles per hour, 3.5 miles. In this case, theoretically, a detour 2.5 miles longer would be preferable to climbing the 8 per cent grade one mile long.

It is also possible to compute the grades at which a 5-ton truck of standard construction and power, fully loaded, will have to change gears; which calculation might be used for deciding upon ruling grades for a road,

*For reasons for making such calculations, see "Practical Street Construction," issue of February 17th, page 239.

and the location imposed thereby. Assuming the following: $W=18,000$ $D=40$ $B=4\frac{3}{4}$ $S=6$ high speed $R=8$; intermediate, 17; low, 36. Top speed on high gear is 14 miles per hour, on intermediate, $6\frac{3}{4}$, and on low $3\frac{1}{2}$ miles per hour. By Myers' formula and for high gear:

$$TF = \frac{28.2 \times (4\frac{3}{4})^2 \times 6 \times 36}{40 \times 18,000} = .04\frac{1}{4}$$

This result is made up of traffic resistance as well as grade resistance. The former is equal to 0.02 and the latter therefore equals $0.02\frac{1}{4}$, corresponding to a $2\frac{1}{4}$ per cent grade, the highest the truck could climb on high speed. Solving for second speed by using 17 in place of 8 in the last equation, we find 7 per cent to be the heaviest grade that can be climbed on second speed; grades over this requiring the use of low speed.

From the same formula it is possible to determine the theoretical trailer loads that can be hauled in addition to the body or carried load, and the grades on which these can be handled. This formula, however, usually gives rather high results and a better and more generally used one for average motor trucks is:

$$P = \frac{5.18364 B^2 S N R}{D}$$

where P is tractive power and N the number of cylinders. Substituting the values for the 5-ton truck given above,

$$P = \frac{5.18364 \times 4.75 \times 4.75 \times 6 \times 4 \times 8}{40} = 561$$

which is the tractive power on high gear. With a weight of truck and load of 18,000 pounds, no grade, and a road resistance of 40 pounds per ton, the effective tractive power left for use on a trailer is $561 - 360 = 201$. At 40 pounds per ton, this would overcome a resistance of about 5 tons combined weight of trailer and load. By using low gear ($R = 36$), $P = 2526$. With this gear, the truck load of 18,000 pounds and a trailer load of 10,000 pounds, the grade that could be negotiated would be

$$2526 = (18,000 + 10,000) \times (.02 + g)$$

$$g = 7 \text{ per cent.}$$

By the methods employed in other parts of this article, the distances economical to detour in order to avoid grades can be computed for the trucks when equipped with trailers.

Much of the information in regard to the trucks and their operation used in these calculations was obtained through the courtesy of *Commercial Vehicle*.



Courtesy of Providence Journal.

EXCHANGE PLACE, PROVIDENCE, R. I.
Confusion of tracks and congestion of cars.

THE FIELD FOR EARTH ROADS.

All through the Central States there seems to be at present an unexpected interest in earth roads, and there is a widespread desire to have an authoritative opinion on the field for which such roads are adapted. It is a subject on which many experienced road engineers are not willing to make any statements for fear of being misunderstood or misquoted, but the road engineer of the Illinois State Highway Department has recently made some comments that answer a part of this oft-repeated question as follows:

"The earth road cannot, by any system of maintenance, be kept up throughout the entire year to the usual standard of the other types. The use of the road in a wet and softened condition is what causes the trouble. Under the conditions where the earth road is a suitable type, its total cost for construction and maintenance is less than that of any other type. In dry weather and when it is not too dusty, the properly constructed and maintained earth road is by far more pleasant and more satisfactory to travel upon than any other road. With neglected maintenance, however, no other type of road can go to pieces and become impassable so quickly as an earth road. Nor, on the other hand, can any other type be brought to a satisfactory condition for travel so quickly and so cheaply after having been impassable. From these peculiar features, it will be noted that practically the entire problem with earth roads is their proper drainage and systematic maintenance. The opportunity for bettering our road conditions by properly improving the earth roads is almost beyond our imagination."

TRAFFIC CONGESTION IN PROVIDENCE.

Practically every street car in Providence, R. I., passes through Exchange place at least once each trip. There are steady streams of cars at this point at all hours of the day, and there is such confusion of tracks that the cars are usually delayed many minutes in passing through. This is due, in a large part, to the fact that each car entering or crossing Exchange place, with very few exceptions, cuts into or across practically every other line of tracks. Consequently a delay or block in traffic on one line is generally felt by cars on several other routes and for considerable distances. Many of the switches the motorman must set himself, and in so doing must stop his car where it blocks several other lines. Also, Exchange place is so crowded with tracks that ordinary traffic frequently causes hold-ups and blocks. This is also the case on many of the narrow streets running into Exchange place, and a block on any of these ties up a large part of the loop.

The general practice of running cars in groups adds to the delay, since one group of cars is sometimes compelled to wait several minutes to get through a stream of cars passing in another direction. Other cars are delayed by being obliged to "lay over" for a few minutes in the loop in order not to disarrange schedules, and these add to the confusion.

There are no cross walks at any point in Exchange place and any person desiring to take a car in the loop proper is compelled to find his way through the heavy and always moving streams of traffic to the proper track.

The WEEK'S NEWS

Street Work in New York, Youngstown and Baltimore—Health Exhibits for New Jersey—Meters for San Francisco—
Report on New Orleans Municipal Light Plant—The Kansas Gas Situation—Fire Losses in Massachusetts—
New Motor Vehicles for Cities—Charter Change for Springfield, Mass.—Commission Elections Lost in
Elmira and Charlottesville—The Chicago Car Fight—Public Service Commissions of New York
and Pennsylvania Rule on Jitneys—New City Halls for Wilmington and Watervliet.

ROADS AND PAVEMENTS

Street Improvements in New York.

New York, N. Y.—Ralph Folks, commissioner of public works, in a report for 1915 on the division of sidewalks sent to Borough President Marks, says that the sidewalks of Manhattan have been entirely freed from canopy awnings with permanent iron supports, which were both objectionable and dangerous to pedestrians and frequently caused serious accidents. The report also states that almost 80 per cent. of the street corners in Manhattan were equipped with the new type of street signs which combined in one frame both street and avenue. Of congested traffic at Fifth avenue and 42nd street the report says: "A recent traffic count on a weekday period of ten hours, from 8.30 a. m. to 6.30 p. m., showed that 113,780 persons and 18,000 vehicles crossed at this important intersection during that time. In one period of fifteen minutes between 10.45 and 11 a. m., on Fifth avenue alone, 433 vehicles passed. At this point the Borough President inaugurated a novel experiment of painting footprints on the crosswalk to dissuade pedestrians from crossing in the middle of the block, where a large proportion of accidents happened."

Improvements in Youngstown.

Youngstown, O.—City engineer F. M. Lillie has presented to service director Harry Parrock his report of activities in his department during the year 1915, showing that \$925,732.11 had been expended on contract improvements in that period and that the valuation of all existing street improvements is \$5,742,380. The following figures summarize briefly how the money has been used during the year. Contract work during the year: Paving, \$311,608.66; repaving, \$23,149.67; sewerage, \$129,277.19; grading, \$40,617; sidewalks, \$70,655; sidewalk repairs, \$6,092; cross-walks, \$1,078, and Milton reservoir, \$343,254.59. This is only the amount spent on the reservoir during the year 1915 and does not include land purchases. A summary of the value of existing street improvements shows: Paving, \$3,408,361; paving (good roads in territory taken into city), \$444,000; sewers, \$1,535,084; grading and guttering, \$364,064; sidewalks, \$905,771; bridges, \$85,000.

Progress on Viaduct.

Dallas, Tex.—Great headway is being made in the construction of the Commerce street viaduct, which is being built jointly by the city, the Union Terminal Company and the county. The Union Terminal Company, building the new Union station and terminals, has finished the construction of two large reinforced concrete piers at the foot of Commerce street, between the railroads and the old county bridge. The west pier is owned jointly by the terminal company and the county, as the foundation will support steel girders to be placed by the railroads and the county in both directions. The Gilsonite Construction Company has the contract to build the county's portion of the viaduct.



Courtesy, Dallas (Tex.) News.

WORK ON NEW VIADUCT IN DALLAS.

City Can Force Good Pavement.

Baltimore, Md.—The city has a right to force property holders to tear up imperfect brick pavement and replace it with cement, according to Judge Dawkins in an opinion handed down in the circuit court. But the court holds that the city has no right to have a good brick pavement torn up. The decision is in the suit of owners of about a thousand feet of sidewalk fronting on Leadenhall, Ostend and Race streets, in which an injunction against the city was asked to restrain the city engineer from forcing the plaintiffs to remove their brick pavements and put down cement. The suit attacked the validity of the ordinance and was a test of the law. There are a large number of similar suits pending. The court held that where the city delegates to the city engineer the power to repave sidewalks with one of three kinds of materials such delegations of authority is not improper. Each case must rest upon its own particular facts and circumstances, according to the ruling of the court, and where the city finds a sidewalk in bad condition and in need of improvement it has the right to order the property-owner to repave. In this particular case Judge Dawkins rules that the sidewalk on Leadenhall and part of that fronting on Race street should be relaid, but he does not think it reasonable, lawful or proper for the city to take up the good brick pavement and lay down cement on Ostend street. This, according to the opinion, would be an unwarranted exercise of authority. "While the city is responsible for defects in sidewalks it cannot create a condition or permit (and in effect direct) the laying of a pavement and then arbitrarily direct it to be taken up unless it is in a condition justifying such taking up or removal."

Boulevard to Be Test Road.

Lexington, Ky.—County road engineer R. W. Davis has announced that all obstacles to the reconstruction of McDowell speedway into a paved boulevard have been removed, and that work would probably be started within the month and completed by September. The boulevard's dedication will probably be made a feature of the meeting of the Appalachian Good Roads Association here in September. The plan is to have forty of the companies supplying paving material each lay a stretch of 200 yards with its product.

The boulevard will be put under federal supervision and will serve as a test road for the South for the next twenty years. The boulevard will be divided into twin roadways by park grass plots, illuminated with electric light at night.

Contractor Loses on New Bridge.

Spokane, Wash.—A month behind schedule, the city's new Howard street bridge has been completed and the wood-block paving laid. Four street car lines of the Washington Water Power Company are using the bridge. According to the figures in possession of the city, the Beers Building Company, which built the bridge, will lose about \$2,800, and perhaps more. As the account stands at present, the city has paid the contractor \$12,744.73 on the contract price of \$18,888, leaving a balance to be paid by the city of \$6,143.27. Against this balance are claims and forfeits amounting to \$8,930.10, leaving the bridge company \$2,786.83 to the bad. Weather conditions during the early months of the year held the work up considerably, and the contractor was granted an extension of the time limit from March 20 to April 20. About a month ago the work was tied up by a walkout of iron workers, and work practically was suspended for some time. The city will get another bargain in the new Monroe street approach, and the Beers company stands to lose several thousand dollars on this job also. The engineer's estimate was \$27,500 and the difference between the Beers' bid of \$15,555 and the next bid was over \$10,000. The Monroe street bridge will be completed very shortly.

SEWERAGE AND SANITATION

New City to Fight Joint Sewer.

Monterey Park, Cal.—The first city officials of Monterey Park, just incorporated by an election, have declared they are prepared to oppose Alhambra, Pasadena and South Pasadena in the tri-city plan for the establishment of a sewer farm within the boundaries of the newly-formed municipality. Unofficial count of the votes showed that 686 out of 791 favored incorporation of Montebello and Ramona Acres into a sixth-class city to be known as Monterey Park. The site of the proposed sewer farm is included within the limits of the new city. The newly-elected officers declare that the sewer farm cannot be established on the proposed site without their consent and that this consent will not be given.

City Sued on Sewer Contract.

Atlanta, Ga.—Before a jury in the United States district court the Noll Construction Company is endeavoring to recover from the city of Atlanta between \$18,000 and \$20,000 alleged to be due for work done in connection with the construction of 1¼ miles of the Entrenchment creek sewer. The contention of the plaintiff is that its contract with the city called for a stipulated amount for each lineal foot of sewer laid and for each cubic foot of earth necessarily removed, and the city's contention is that because the company was 120 days over the specified time in completing the contract it refused to pay the contractor's bill in full. The suit originally was for \$30,000, but the amount was trimmed down at a previous hearing of the case by special master Frank E. Callaway.

State Board Offers Health Exhibits.

Trenton, N. J.—As an experimental departure from its usual work, the state department of health has arranged a number of small loan exhibits which will be made available for use anywhere in the state. The subjects treated included housing, patent medicines, diseases of adults and child hygiene. Local boards of health will be invited to utilize the exhibits in their educational work and others desiring to use them may make application, preferably through the local board of health, or, if necessary, direct to the state department of health. The exhibits are adopted for use in schools, libraries, lodge rooms and other places where exhibit material may be shown by boards of health, boards of trade, women's clubs, visiting nurse associations or other organizations desiring to participate in health

educational activities. Each exhibit consists of a number of cards packed in a strong fiber case suitable for shipping. The exhibits will be lent free of charge to any responsible person in the state willing to pay transportation charges. The exhibits now available are described by the board as follows:

"Housing—This exhibit consists of twenty-eight panels, 22x28 inches in size, upon which are mounted pictures of housing conditions secured in connection with the State Tuberculosis Exhibit during its travels over the state. The photographic prints used are 5x7 inches in size, and from two to four prints are mounted on each panel. They illustrate bad housing conditions and appropriate captions direct attention to the bad relation of such conditions to health.

"Patent Medicines—This exhibit consists of about thirty panels, 22x28 inches in size, and was constructed by the American Medical Association to show many of the patent medicine frauds the association has exposed.

"Diseases of Adults—This exhibit consists of twenty panels, 22x28 inches in size, and is a duplication of the exhibit constructed by the New York State Department of Health for use in its educational work concerning the diseases associated with adult life. It is designed to show how to prevent the development of the diseases which cause the degeneration of the heart, kidneys and blood vessels. Some of the pictures and charts in this exhibit are hand-colored.

"Child Hygiene Exhibit—This exhibit consists of twenty-five panels, 18x28 inches in size, and is a reproduction of the child hygiene section of a large child welfare exhibit recently constructed by the National Child Welfare Exhibit Association. The pictures are hand-colored and present an attractive appearance. Thirteen of these panels dealing with baby welfare were used in many communities of the state in connection with baby week celebration.

WATER SUPPLY

Metering San Francisco.

San Francisco, Cal.—On the ground that 30 per cent of the water piped into San Francisco is wasted, the Spring Valley Water Company has announced that meters will be installed on the premises of all its customers not now on a meter basis. Notices are being sent out to consumers to this effect, under a provision in the service rules filed by the company with the railroad commission on April 11, which says the company may substitute meters for a flat rate service after written notification. The flat rates paid by householders at present will become the minimum rates for them after the meters are put in, says manager A. S. Crawford of the Spring Valley Company. The present flat rates are based, according to Crawford, upon the requirements of the household. He says meter tests have been made by the company, to ascertain where the water was going, and in a majority of cases where meters were put in temporarily it was shown that much more water was running than the customers were paying for, due chiefly to negligence and defective plumbing. Only householders will be affected by the change, Crawford says, as meters are now in use in nearly all other places. The company will begin putting in the meters at once.

Youngstown's Waterworks.

Youngstown, O.—State examiner H. D. Defenbacher has made his report to state auditor A. V. Donahey on the operation of the Youngstown waterworks department from October 1, 1914, to January 1, 1916, and a copy has been received by service director Harry Parrock. The criticisms offered by Defenbacher center on two points: payment of employees for time they are off duty and the giving of too much free water. The report cites the cases of four employees, who were off duty from 48 to 126 days each during the year but were paid full time, and another man employed in their place, at the same salary, to do their work. Referring to the distribution of free water, Defenbacher reports that of the \$67,770.49 worth of water given away, \$3,790 of that amount was given away illegally according to the Ohio statutes. Most of this was for street sprinkling and flushing. Aside from these criticisms, the report is highly satisfactory, showing that the local department has been operated at a good profit and under efficient management. In the period covered, \$13,220.29 was spent in extensions for new allotments alone. The following amounts of bonds were found to be outstanding December 31, 1915: Regular, \$582,200; extension, \$1,170,000. Interest on the former to the extent of \$25,309 was paid in 1915 from the department earnings and \$48,890 on the latter, secured by taxation. In this connection a suggestion is made that a waterworks

sinking fund account be created, as the department is paying annually more money into the fund than is required to pay the interest and accruing bonds, which is being used for other city purposes. Receipts for the department are as follows: From flat rates, \$99,844.68; meter rates, \$193,440.64, and miscellaneous, \$29,234.69, for a total of \$293,285.25 in receipts. The total revenues were found to exceed the expenses in 1915 by \$247,630.43. A total balance of \$134,069.33 in the extension, improvement and engines funds was also found to exist on December 31, 1915. Mr. Defenbacher finds, therefore, "that for the year 1915, in addition to furnishing free service at an estimated value of \$67,770.49, the revenue of the plant exceeded the total cost of operation, plus interest on bonds, taxes which would have to be paid if the plant was privately owned, and a fair charge for depreciation, by nearly \$42,000."

Chlorinating San Diego Water.

San Diego, Cal.—The Cuyamaca Water Company has voluntarily installed a chlorination plant at its La Mesa dam with a capacity of from ten to twelve million gallons of water a day, according to Ed Fletcher, manager, and is prepared to furnish the city from seven to eight million gallons of water daily in case of emergency. Since February 1 until the Cuyamaca water was shut off by the city, the company had furnished from 500,000,000 to 600,000,000 gallons to the city, and a booster pump has been installed to increase delivery. With regard to the value of chlorination, Dr. H. A. Thompson, city bacteriologist, states: "I have made examinations of Cuyamaca water in the past two months and it has shown conclusively the value of chlorination."

STREET LIGHTING AND POWER

Disapprove Municipal Plant Plan for New Orleans.

New Orleans, La.—A committee composed of F. W. Ballard, of Cleveland, chairman, Foster Olroyd and Alfred Raymond, has reported to E. E. Lafaye, commissioner of public property, after a thorough investigation of the books and accounts of the New Orleans Railway and Light company, as applied to the electrical department. Its most important finding is that "it would not be practical or possible for the city to construct and operate a municipal light plant and share with the existing companies the present or potential electrical business of the community." The questions investigated were:

1. As to the amount of capital invested in this department, its fixed charges, cost of operation and maintenance and general expenses.
2. Its gross total income from the sale of electric energy.
3. The relative merits and gross revenue to be derived from the application to commercial and residential lighting consumers of the proposed rates of 7 and 4 cents, respectively, based on the first 30 hours' use of the consumers connected load, in comparison with the following block system of charges to be applied, as follows:
Service charge, each meter, 25 cents;
First 20 k. w. hours used each month, at 7 cents k. w. h.
Next 30 k. w. hours used each month, at 6 cents k. w. h.
Next 150 k. w. hours used each month, at 5 cents k. w. h.
All in excess, 4 cents k. w. h.
4. To make such recommendations as to adjustment and application of rates so that the charge for services received by all types of such customers will be fair and equitable.
5. To advise if the construction and operation of a municipally owned electric plant, complete in every detail, and of sufficient capacity to serve the entire built-up area of this city, would make possible any material further reduction in the cost to our citizens of such service.

The committee finds that the bonds of the New Orleans Railway and Light Company show an original investment value of the property of \$8,149,033.26. The cost of duplicating the system is placed at approximately \$5,000,000. Annual items are:

Interest at 6 per cent on \$5,000,000.....	\$300,000.00
Depreciation at 3 per cent on \$5,000,000.....	150,000.00
Taxes, insurance, etc.....	146,047.57
Operating expenses	564,226.00

Total\$1,160,273.57

"On the question of operating expenses, which show a unit of cost of 1.56, including station cost, fuel, line, and distribution expenses, office salaries, etc., we consider this cost fair and about as low as could be expected in this city, for it must be borne in mind that conditions in New

Orleans are very different from those found in most cities. The expenses of maintaining, operating and distributing is greater, by reason of the extensive area to be maintained with a smaller number of customers. Fuel cost is higher than the average, and the load factor here is much lower than the average, thus increasing all unit costs of operation."

The gross totals of energy sold and revenue derived therefrom for the year 1914 is as follows:

	K.W.H.	Revenue.
Municipal Arc	7,519,449	\$247,827
Municipal Incandescent.....	535,335	32,606
Municipal Power	64,286	3,145
Commercial Flat Rate Lighting.....	372,524	23,551
Commercial Flat Rate Power.....	19,101	1,095
Res. and Commercial Lighting.....	5,737,500	553,669
Employes Lighting	31,317	1,547
Special and Wholesale Lighting.....	5,256,500	252,131
Commercial Power	1,434,840	86,000
Wholesale Power	5,097,891	146,483
Other Corporations	10,404,330	72,948
	36,473,073	\$1,421,002

The committee agrees that it is inadvisable to establish a rate based on the consumer's connected load, as the load factor in New Orleans is small. After an intensive study and with convincing figures, the committee recommends a flat rate of 6 cents per k.w.h. for all commercial and residence light customers up to and including the first 200 k.w.h. in each month, and 4 cents per k.w.h. for all energy consumed in excess thereof with a service charge of 25 cents per meter and a minimum consumption of 50 cents per month. These rates would cause a reduction in revenues of \$260,383 from the 1914 revenue of \$1,421,002, which, in the opinion of the committee, would bring it down nearer to the "fair" allowance of \$1,160,273.57.

The committee, guided by the experience of Mr. Ballard, finds that it is not possible to serve electrical energy in this city at rates that will bear fair comparison with rates in effect elsewhere, owing to local existing conditions. New Orleans, covering as it does, an unusually extensive area, with its unfavorable soil and climatic conditions, as applied to electric service equipment, the fact of its rates having been unpopular and its number of consumers small, and the investment necessarily large, all tend to operate against the possibility of securing such service from private enterprise or municipal operation at rates equal to what is possible elsewhere. To demonstrate the reasons for these conclusions the committee cites the following comparisons with Cleveland:

Operating cost as shown hereinabove by the company per k. w. h. sold.....	.0156
Operating cost of Cleveland municipally owned plant0121
Total area served by local company, sq. miles....	69
Total area served in Cleveland by municipally owned plant and private plants, sq. miles.....	60
Total number of consumers in New Orleans.....	18,000
Total number of consumers in Cleveland.....	90,000
Fuel cost in New Orleans, per ton	\$2.60
Fuel cost in Cleveland, per ton	\$1.70
Municipal plant investment in Cleveland, presently serving 16,000 customers.....	\$2,500,000.00
Municipal plant required in New Orleans.....	\$5,000,000.00

Try to Force Gas Company Sale.

Topeka, Kans.—Governor Capper has asked the attorney general and the attorneys for the public utilities commission for an opinion as to whether or not the state could force the sale of the Kansas Natural Gas Company through a foreclosure or a dismissal of the anti-trust suit under which the receivers were appointed. The stockholders of the Kansas Natural have blocked the sale of the property to the Wichita Natural Gas Company, controlled by Henry L. Doherty & Co. of New York. Now the governor is going to try to find a plan by which the company can be taken out of the hands of the lawyers, receivers and the district court of Montgomery County, all being aids in blocking the sale, as continued control means continued fees for them, and sell the property to the Dohertys or any other interest that wants to buy it and will furnish gas. The gas rate case is still being argued in the United States Circuit Court of Appeals at St. Paul. It has been known that the Barnsdall-Snyder interests in the Kansas Natural have been helping the lawyers, receivers and the district court of Montgomery County to block the sale, which has been pending for five months. Barnsdall, Snyder and Long owned all the stock

of the Kansas Natural. It was given them in payment for the leases they obtained in Kansas and Oklahoma. They have sold most of this stock, but Barnsdall has been a trustee for the stockholders in the affairs of the company. Long does not own any stock now and the Snyder estate has only a small amount. The bank of Pittsburgh which owns or controls most of the bonds of the Kansas Natural has desired to sell out and it was through it that the Doherty interests began their negotiations. The Wichita Natural wants the property to enable it to market a large supply of gas which it cannot use in the present lines. The Barnsdall interests see a chance for a large amount of money to come to them through blocking the sale of the Kansas Natural. The creditors' agreement provides for certain payments on the bonded debt each year and when these payments are made the property is to be restored to the stockholders free of debt. These payments have all been made up to the present time and the receivers have asserted the payments will continue to be made. At one hearing an officer of the company told the public utilities commission that the payments had been made even if the company was prevented from making extensions of its lines to get more gas, frankly stating further that the gas-consuming public could suffer until the debts of the company were paid. After the debts are paid the plant would be turned over to the stockholders. It has been variously estimated that the property would be worth two to eight millions at that time. The stockholders have a big monetary interests in blocking the sale of the property now. The Doherty interests are reported to have offered seven million dollars for the property. After the bonds are paid, that would leave only a small sum to be distributed to the stockholders. The Doherty interests have offered to buy the property, put one million dollars into it for new pumping plants and to supply fifty million feet of gas additional to that now being pumped, and in the winter months to increase that to 150 million feet more than the Kansas Natural has ever put into the lines on any day.

FIRE AND POLICE

Fatal College Fire.

Oskaloosa, Ia.—Two men were killed, two probably fatally injured and property damage estimated at between \$80,000 and \$100,000 wrought by an early morning fire which broke out in the main building of the Penn College here. The business manager of the college and a student were those who died.

Fire Losses in Massachusetts.

Boston, Mass.—Rain and an absence of holocausts cut the total 1915 fire losses of Massachusetts down to \$9,693,872 from the 1914 figure of \$26,194,270. To the heavy showers, deputy chief George C. Neal of the state police, in his report to Insurance Commissioner Hardisan, credits a large part of a decrease of \$2,773,665. The remainder of the decrease, or \$13,726,533, represents the loss in 1915 in the great Salem fire. The total fire losses in the various cities generally showed decreases, Springfield dropping from \$318,668 to \$168,656, as chief William H. Daggett has already reported. The Worcester drop was even greater, having been \$569,410 in 1914 and only \$166,656 last year. The total amounts of insurance paid throughout the state was \$8,565,660, or within almost \$1,000,000 of the losses. The police and fire department sleuths learned that 175 of the total of 8,030 were incendiary. The report lists the motives for setting these as follows: For insurance, 34; malice, 55; revenge, 5; spite, 3; by insane or demented persons, 2; by drunks, 1; by burglars, 1; by trespassers, 1; by babies, 1; unknown motives, 43. Seventy-eight arrests for arson were made and 49 convictions were secured.

Test New Traffic Semaphore.

Baltimore, Md.—A new semaphore, which may eventually displace those now used by the police traffic squad at busy crossings, is to be tried at several points downtown. One of them has been erected at St. Paul and Fayette streets. The mechanism is electrically operated and displays big illuminated discs, or "eyes," on its four sides,

showing a red light for "stop" and a green for "go." The apparatus, which is shown in the accompanying illustration, is operated by the policeman in charge by pressing a button in an extension switch.

Electric Plant Destroyed by Fire.

La Crosse, Wis.—The lighting plant of the Wisconsin & Minnesota Light and Power company was destroyed by fire which was started by a bolt of lightning during a severe electrical storm. The loss is estimated at \$75,000 fully covered by insurance. All factories and business places depending on electric power were forced to close and street cars and wire service were put out of commission and newspapers were compelled to issue in abbreviated form.

MOTOR VEHICLES

Motorizing Spokane.

Spokane, Wash.—Six months will see the last of all horse-drawn fire apparatus in Spokane, according to an announcement made by Fire Chief A. L. Weeks, who stated that a new gasoline pumping engine and hose auto has been completed at the fire shop and will replace five horses and a fire engine and hose wagon at station No. 2, thereby saving approximately \$4,000 a year. At present it requires a driver for both the hose wagon and engine at No. 2, and also an engineer and stoker to care for the engine. The work of these four men will be handled by one man, a driver, thus allowing the other three men to aid in fighting the fires. There are now fifteen horses in use at the fire stations. The five horses at No. 2 will be turned over to the city purchasing agent and sold, thus leaving but ten horses, where a few years ago 47 horses were used. The others will be replaced before next year.

Purchase New Combination.

Rahway, N. J.—The common council of Rahway has voted to purchase a 750-gallon triple combination motor fire engine for \$8,500 from the American-La France Fire Engine Company, of Elmira, N. Y.

New Pumper Does Well in Test.

Stamford, Conn.—The Stamford fire department's powerful new six-cylinder motor pump has been tested and found to exceed some of the requirements in the contract. The big test of the day was that of pumping water through 100 feet of hose with a 1¾-inch nozzle. The engine pumped at the rate of 170 gallons of water per minute for a half hour in this test, which is 20 gallons more per minute than the American-La France Company, builders of the engine, claimed for it. The pressure on the nozzle during this test was 72 pounds, while the pump pressure was 135 pounds. It pumped through a single line of 500 feet of hose with a 1-inch nozzle 350 gallons per minute for 15 minutes, the pressure on the pump being 270 pounds and at the nozzle 140 pounds. The tests aroused considerable interest. Operations were in charge of Chief H. W. Parker and Chief Fancher of New Haven, with a party of fire commissioners from that city, come down to witness the tests. The machine cost about \$8,500.



Courtesy, Baltimore (Md.) News.
BALTIMORE'S NEW
TRAFFIC SIGNAL.

Buy Three-Ton Truck for Street Work.

Bristol, Va.—Acting for the committee of seven appointed by the council, Councilmen J. W. Mort, R. F. Wagner, R. D. Smith and C. P. Moore have purchased for the city a three ton auto truck for street work. The committee went to Detroit to inspect the machines manufactured there. A General Motors truck, costing \$4,200, was bought. It has a new type of dumping body especially adapted for spreading stone and other materials. It is estimated that the machine will save the cost of working eight teams of horses, or about \$30 a day.

Purchase New Truck.

Waynesboro, Pa.—Waynesboro's town council has bought an American-La France automobile truck for the Always There Hook and Ladder Company, appropriating for it \$5,700, an allowance of \$1,200 to be given the borough for the old aerial truck now used by the company. The city service truck purchased by the borough will be a 6-cylinder machine, with one chemical tank to hold 40 gallons of fluid and 200 feet of 3/4-inch chemical hose, a hose body to carry 1,000 feet of standard fire hose; a full ladder equipment and all other equipment that goes with this type of apparatus. The ladders include a 50-foot extension and a 35-foot extension ladder and roof ladders. It will have a wheel base of 240 inches and the wheels will be equipped with Goodyear tires—a single tire on each front wheel and dual tires on the rear wheels. The truck is to be geared to run not more than 25 miles an hour.

GOVERNMENT AND FINANCE

Springfield Wins Its New Charter.

Springfield, Mass.—After many months of bitter fighting in the legislature following several months work of the charter committee which campaigned actively in the city and in Boston, the new charter bill has passed and been signed by the governor. The question was one of home rule and the people of Springfield are to ultimately decide on one of four forms of charter. The character of the legislative fight is indicated by a speech of one of the representatives in which he warned the house not to "perpetrate this outrage on the people of Springfield"—"outrage" referring to the city manager plan.

Workmen's Compensation for Municipal Employees.

Albany, N. Y.—Governor Whitman has signed the amendment to the workmen's compensation act and it has gone into effect. It particularly affects the employees of municipalities in the state and includes many city functions as extra hazards. Men in the street and garbage departments, sewage plants and waterworks, police and fire departments, janitors and similar employees are provided for. It is optional with the city whether it shall carry its own insurance or place it with the state or with private companies.

Central Purchasing in San Diego.

San Diego, Cal.—All purchases for the various city departments are now under the supervision of Manager of Operation Lockwood, the budget ordinance adopted by the council, which provides for a transfer of the purchasing bureau, being now in effect. Eugene Williams will succeed C. R. Stewart as purchasing agent. Williams now holds the position of requisition clerk. Reporting to Mayor Capps, John J. Hetzel, who is auditing the city books, recommends that the purchasing bureau be transferred to the city auditor. He points out that considerable could be saved through a consolidation with the auditor's department.

A Three-Mayored City.

Winchester, Ky.—Winchester has three mayors and is facing a complicated situation. Mayor D. T. Matlack is taking cavalry training at Fort Oglethorpe, Ga. The city council at its regular meeting chose M. S. Brown as mayor pro tem. At this meeting an order was entered that a committee be appointed to employ an expert accountant to audit the city's books. Brown failed to qualify as mayor and

failed to appoint a committee. At a called meeting of the council, Dr. Brown being absent, H. B. Schrivener was made mayor pro tem., and he immediately took the oath of office. At the special meeting the order for auditing the books was rescinded. The next day Brown qualified as mayor pro tem., and, ignoring the action of the special meeting, appointed councilmen Schrivener, Nunan and George as a committee and served them with notice for a meeting. Schrivener refused to meet with the committee, and then, acting as mayor pro tem., issued a counter order and served counter notices setting forth the action of the special council meeting at which he was named mayor. Councilmen George and Nunan held a meeting and agreed to employ an accountant, the name being withheld until a contract is made.

Commission Form Outvoted.

Elmira, N. Y.—A movement to give Elmira commission government under "plan C," providing for a city manager and five commissioners, was defeated by a 471 vote majority.

Commission Form Voted Down.

Charlottesville, Va.—Charlottesville has voted against the commission form of city government, 178 votes being cast for the proposed change and 257 against. Only half of the total possible vote was polled.

RAPID TRANSIT

Public Service Commission Jitney Ruling.

Harrisburg, Pa.—A general ruling governing all auto bus lines or jitneys in the state has been issued by the Public Service Commission. In part it is as follows: "Certificates of public conveyance evidencing the approval of the commission will be limited to the route and number of cars and particularly to each automobile or auto bus designated in the certificate; application may be made for the approval of additional cars, including substitutions and replacements, verified by affidavit, but certificates will be non-transferable. Automobiles or auto busses authorized to be common carriers shall have painted on each side of the vehicle three lines containing the name of the person to whom certificate is issued, the words auto bus and the number of the public service certificate. Persons holding certificates will not be allowed to carry more persons than the seating capacity of the designated car and the filed rates and charges must be posted in each car. The commission reserves the right to revoke any certificate."

Chicago Wins in Home Rule Car Fight.

Chicago, Ill.—In an opinion handed down by Judge Thomas Taylor in the circuit court the right of the state public utilities commission to issue orders with regard to the service and equipment of the street railways of Chicago was held invalid, and it is expected that a permanent injunction will be granted in favor of the city. The opinion virtually means that for the present, at least, the commission's order of September 29, 1915, seeking to improve street car service, will not be carried out. The opinion states that that order invades some of the rights of the company and the city and consequently is in violation of their constitutional rights. "It must be borne in mind," the opinion reads, "that the commission has no jurisdiction over the streets of the city of Chicago; that it has no jurisdiction over the ever-changing traffic conditions; that it has no jurisdiction over foot passengers and vehicular transportation, which constitutes the major part of the use of the streets of Chicago. The street railway situation in Chicago is unique. The companies have had a long and checkered career. They have been affected by the constitution of the state, by many acts of the legislature, by ordinances of the city council and decrees and judgments of the court until now under a settlement ordinance they have constituted a coherent system of nearly 1,000 miles of street railways, paying into the city treasury 55 per cent of their net earnings." This settlement ordinance was agreed upon in 1907 and again in 1913, and Judge Taylor held in his opinion that the commission's order was in violation of both these settlement ordinances. With reference to the city's claim as to the illegality of the formation of the public utilities

commission, Judge Taylor said: "In the courts of argument a number of questions have been raised as to the constitutionality of the act creating the public utilities commission. All of these questions, advisedly, are here left unanswered. The legislature of the state of Illinois has seen fit to pass the act which provides for the regulation of public utilities, and that act is presumed to be constitutional until it is proven beyond a reasonable doubt to be otherwise." The state public utilities commission's betterment order was entered at the instance of the Cook County Real Estate Board, which charged that the surface lines were not doing everything possible to give the citizens of Chicago adequate transportation. After several months of examination, during which hundreds of witnesses were questioned, the order was entered. The order provided for turn-back service outside the loop; for extra cars and trailers during rush-hour periods, and for additional street car lines. The companies were given sixty days in which to comply. A short time after the entry of the order, the city brought suit in the circuit court for a writ of injunction to restrain the commission from enforcing the order and the railways company from obeying the order, and the railways company, taking sides with the city, filed a cross bill to restrain the commission from enforcing the order. Judge Taylor's decision was on the commission's demurrer to the bill and cross bill, which demurrer was overruled. The next step will call for a permanent injunction against the utilities commission.

Use Jitneys to Force Better Car Service.

Rochester, N. Y.—An opinion holding that jitney busses in New York state can only be operated properly upon streets not having street car lines, and denying the application of about sixty persons for certificates to operate such vehicles on the streets of Rochester, has been rendered by the upstate public service commission at Albany. The commission held that the operation of about 136 jitney busses upon the Rochester streets could not meet the demands of public convenience as well as will the street railway service when needed improvements are made. The dismissal of the jitney bus applications, however, was accompanied by a demand that the New York State Railways Company improve its operating methods and construct new lines in Rochester. The commission notified the company that unless its recommendations were acted upon within thirty days formal proceedings to enforce such orders would be started. It was said that should the proceedings fail to cause the desired improvements another application for the operation of jitney busses would receive more favorable action.

MISCELLANEOUS

New City Hall for Wilmington.

Wilmington, Del.—Following the dedication of the new joint city and county building in this city, it is now occupied and in full service. Governor Charles R. Miller represented the state, and mayor James F. Price, the city; Everett B. Hollingsworth, of the levy court, represented the county, and judge James Pennewill, chief justice of the state, was orator. The new building cost \$1,500,000, exclusive of the ground.

No Free Telephones for Cities.

Tempe, Ariz.—Judge Lyman of the superior court has handed down a decision in the case of the town of Tempe against the Arizona Corporation Commission, involving points which have been of considerable interest to several municipalities in the state. When the Mountain States Telephone & Telegraph Company purchased competing systems in the state, there existed numberless discriminations in unequal rates, service not properly classified, etc., and the commission also found that in many of the smaller towns free telephone service was being given to the towns for franchise privileges, and that these free telephones were installed in the residences of the various city officials. The commission, under the provisions of law requiring that improper discrimination be eliminated, entered an order

that such free service should be discontinued, and that the city officials should pay regular rates, and held that when free telephone service was given in return for franchise privileges that such a contract was not a valid one. The town of Tempe immediately started action before the commission to set aside the order but the commission refused to do this. Then the town commenced action in the superior court against the commission.

New City Hall Opened.

Watervliet, N. Y.—Moving day for official Watervliet found the mayor, commissioners of public safety, public works, charities and members of the police department vacating the building which has been used for forty years. The new building is occupied on the lower floor by the post office and police department, while private offices are furnished for the chief of police, city judge, and charity commissioner.

City Pound Electrocutes Dogs.

Omaha, Neb.—The city pound is now electrocuting the dogs in a special cage designed by city electrician Curran and poundmaster Waggoner. The cage into which the dogs were placed is six feet square, with a marble floor. Strips of steel are placed both ways of the marble, and through this metal the contact is made. After the dogs are inclosed a switch is thrown and the victims topple over instantly and within three seconds are lifeless. Three dogs are electrocuted at one time. When further improvements are made it will be possible to kill as many as twenty with the same current. The device has been declared a success and Humane Society says it is the most humane method of killing dogs. The apparatus was made by an Omaha electrical firm and will cost the city \$275 when formally accepted. The old method of applying charcoal fumes to impounded dogs will be abandoned.

Municipal Lodging House Profitable.

Palo Alto, Cal.—Chester F. Noble, chief of police, has submitted a report to the city council on the operations of the municipal lodging house for the winter months. The report states that the enterprise was more than self-supporting and an analysis of the figures shows that while the amount appropriated (\$650) was exceeded by only \$10.29, there was turned into the general fund \$362.44, with a further estimated income from the potato crop of \$500 and \$170 worth of kindling wood still on hand. This income aggregates \$1,032.44. The hostel was opened for the winter season on December 20, 1915, and remained continuously open until April 1, a period of 102 days. During that time 840 men were cared for and a total of 6,037 meals were served. The least number of men sheltered at any one time was three, and the highest number was 30. Voluntary donations were made by various merchants and individuals, 47 persons and firms sending in donations of money, clothing, bedding, foodstuffs, kitchen accessories, drugs, reading matter, shoe repairing outfits and toilet articles.

Beginning of State Park System.

Spencer, Ind.—McCormick's creek canyon, in Owen county, also known as the "Grand Canyon of Indiana," becomes the first unit in Indiana's centennial park system with the purchase by the state memorial park committee of a 350-acre tract at a sale held here. The committee paid \$5,250, the appraised value of the canyon farm. People of Spencer and Owen county were eager to have the state buy the canyon, and in two days raised \$1,355 for the park fund. About 150 acres of the upland, part of it cleared and the remainder wooded, is suitable for golf links, tennis courts and baseball diamonds, while the heavier woodland can be made into an attractive picnic grove. The state park committee will formulate tentative plans regarding the conversion of the farm to park uses at an early date. Land owners living near the tract have begun the work of opening a third approach to the new state park, which will enable tourists from Indianapolis and northern points to reach it by way of Gosport without passing through Spencer. Two farmers have offered a 40-foot strip for a roadway, and it is expected all the necessary ground will be donated.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS.

Highways:

The Columbia River Highway. History and description of a mountain road in Oregon, 60 miles long that has been completed in two years at a cost of more than \$1,500,000. By Geo. C. Warren. 2 ill., 1,500 words. Contracting, May. 10 cts.

Features of Highway Work in Hawaii. An interesting discussion of the difficulties confronting the road builder in Hawaii. From a paper by H. K. Bishop. 7 ill., 2,500 words. Good Roads, May 1, 10 cents.

State:

Oklahoma Highway Department. Describes the operation of the department under the new law. It collects and distributes automobile license fees, examines county engineers, prepares standard plans and specifications, in addition to regular engineering work. 1,200 words. Municipal Journal, May 4, 10 cents.

Construction:

Practical Street Construction—Street Cross-Section. Relative positions of sidewalks, roadways, parkways, planting strips and parking places. Adapting design to local conditions. 8 ill., 2,000 words. Municipal Journal, May 4, 10 cents. Reasons for crowning roadway, form of crown and calculations for the same and amount of crown for different pavements. Side-hill sections, top-sided crowns and continuous cross-slopes. 2 ill., 2,000 words. Municipal Journal, May 11, 10 cents. Slope of sidewalks and of planting strips. Relative elevation of gutters, curbs, planting strips, sidewalks and yards. Terraces and retaining walls; preservation of shade trees. 11 ill., 1,500 words. Municipal Journal, May 18, 10 cents. Hillside streets' treatment of up-hill sidewalks; two-level streets, viaducts and streets on bluffs or very steep hills. 9 ill., 1,500 words. Municipal Journal, May 25, 10 cents.

Details of Construction Plant and Methods, Easton-Allentown Road. Grading and draining; transportation and storage of materials; construction plant and procedure; finishing and curing. 1,800 words. Engineering and Contracting, May 17, 10 cents.

Organization as Influenced by Plant of Concrete Gangs for Road Construction. Report of Committee on Concrete Gang Organization. Gives detailed directions for construction work. By H. P. Gillette. 1 ill., 2,500 words. Engineering and Contracting, May 24, 10 cents.

Drainage and Preparation of Sub-grades. A review of the general subject of drainage and a description of some examples of poor drainage conditions and how they have been taken care of. John H. Huber. 6,000 words. Better Roads and Streets, May. 15 cents.

The Portable Railway in Highway Construction. Discusses the use of the portable railway from the viewpoint of costs and convenience in construction and gives some actual figures. 3 ill., 1,500 words. Good Roads, May 1, 10 cents.

Special Types of Equipment Used on Car Track Paving. This article describes a special type of paving work often encountered by contractors. A mixer with two loaders, mounted on car, and unusual method of handling materials marked the work. Cramped space and the necessity for maintaining street car traffic increased the difficulty. 5 ill., 1,800 words. The Contractor, May 1, 20 cts.

How to Use Scrapers on Street and Road Grading Work. The sixth in a series of articles on street and road construction. This takes up several types of road grading machinery, giving prac-

tical suggestions as to their operation. By Daniel J. Hauer. 2,500 words. The Contractor, May 1, 20 cents.

Road and Bridge Construction and Maintenance in Nova Scotia. Summary of work done according to report of the highways department. 4 ill., 2,500 words. Canadian Engineer, May 11, 15 cts.

Maintenance:

Patrol System Improves Conditions of Dirt Roads Fifty Per Cent. at Low Cost. System started in Clayton county, Iowa, three years ago has proved its value in efficiency and economy in maintenance work. By E. B. Tourtellot. 1 ill., 1,500 words. Engineering Record, May 13, 10 cts.

Lessons in Road Maintenance in New York State. How early types of construction have become inadequate. Heavier foundation courses and definite surface treatment now demanded. Success depends upon accommodation and willingness to work. 3,900 words. Engineering News, May 11, 15 cts.

Foundations:

Artificial Foundations for Pavements. Discusses the various types of artificial foundations for the support of pavement surfaces. From a paper by W. W. Crosby. 1,600 words. Engineering and Contracting, May 17, 10 cts.

Pavements:

Comparative Values of Various Approved Forms of Street Pavements and Roads. Destruction of a pavement is determined by wear and age. From the point of economy several factors must be considered in ascertaining the endurance of a road. By E. M. Requa. 3,000 words. Engineering and Contracting, May 24, 10 cts.

Review of 1915 Paving Work. Summary of annual reports of city and town engineers in Canada showing the amount of paving work done during the year ending December 31, 1915. Some interesting tables are included. 2,500 words. Canadian Engineer May 11, 15 cts.

Bitulithic:

Method and Cost of Bitulithic Paving in Pierce County, Washington. The Alderton-Orting road, 5.319 miles long, was paved in 48 working days at a cost of 60 cents a sq. yard for concrete base, 68.6 cents for bitulithic top and 23.4 cents for concrete curb. By David H. White. 2 ill., 1,000 words. Engineering News, May 25, 15 cts.

Bituminous:

Factors in Construction of Bituminous Pavements. Gives the requirements for a satisfactory paving plant and discusses methods of mixing and laying materials. By Lester Kirschbraun. 5 ill., 3,000 words. Better Roads and Streets, May. 15 cts.

Recent Developments in Bituminous Macadam and Bituminous Concrete Pavements. Author discusses improvements made in the construction of bituminous concrete pavements during 1914 to 1916. From a paper by A. H. Blanchard. 4,000 words. Canadian Engineer, May 11, 15 cts.

Twenty-one of Miami's Principal Streets Paved with Topeka Mix. General description of asphalt plant, method of laying and contractor's plant. 7 ill., 1,000 words. Better Roads and Streets, May. 15 cts.

California's Bituminous Carpeted Concrete Road Shows Durability in Service. Construction methods, first cost and maintenance charges are considered. Conclusions are based on observation of 400,000 sq. yds. of thin top bituminous surfacing, some of which has been in use two years. From a report by W. C. Howe. 5 ill., 2,000 words. Engineering Record, May 6, 10 cts.

Concrete:

Methods and Cost of Concrete Road Maintenance in Ohio. The maintenance work on the state roads of Ohio has been done under the supervision of many different patrolmen and superin-

tendents, due to the fact that most of the state roads are disconnected short sections. Methods used in repairing the various kinds of defects are described. 3,500 words. Engineering and Contracting, May 10, 10 cts.

The Easton-Allentown Concrete Road: An exceptional example of modern road engineering. Detailed description of construction methods. By W. D. Uhler. 5 ill., 1,500 words. Engineering and Contracting, May 24, 10 cts.

Concrete Road Building in Norwalk. Comparison of pavements with and without reinforcement on streets with and without street railway tracks. Describes the method of handling aggregates, setting reinforcement and expansion joints; organization of force. By C. A. Betts. 3 ill., 1,750 words. Municipal Journal, May 18, 10 cts.

Concrete Paving on Dupont Road. Nearly all of the road is reinforced. Effect of reinforcement and of various quantities of hydrated lime. Details of construction. 1,250 words. Municipal Journal, May 18, 10 cts.

Concrete Paving a Remedy for Un-sightly Alleys. Costs given for work done by day labor force which laid 3,575 yards last year. By J. C. Hiteshaw, City Engineer, Carlisle, Pa. 2 ill., 1,200 words. Engineering Record, May 27, 10 cts.

Water Supply for Concrete Pavement Construction. Chances of miscalculation in the matter of water supply are as great as in any item of the complete work. Location of supplies, means for adequate conveyance and pumping costs should be carefully calculated. Good water supply is essential. 2,500 words. Engineering and Contracting, May 10, 10 cts.

Gravel:

Construction of Gravel Road by the Feather-edge Method. There are two general methods of gravel road construction, the trench method and the feather-edge method. Two-course construction; one-course construction; special features of gravel roads. 1 ill., 3,000 words. Engineering and Contracting, May 10, 10 cts.

Macadam:

The Macadam Road System of Franklin County, Ohio. Discusses the organization and methods of construction in a county particularly rich in stone suitable for macadam road construction. 8,000 words. Better Roads and Streets, May. 15 cts.

Wood Block:

Wood Blocks for Street Paving. Their Treatment and Handling. This article compares the specifications under consideration by two societies. 1 ill., 1,800 words. Municipal Engineering, May. 25 cts.

Miscellaneous:

Caliche Roads: a New Type of Construction in Arizona. A cemented conglomerate blasted from pits is broken by sledge hammers, and fragments over 4 inches are rejected. 8 ill., 1,100 words. Engineering News, May 4, 15 cts.

Paving Along Street Railroad Tracks. Solid track construction is the first requisite for durable pavement. Suitability of several paving materials for paving along tracks as viewed by street railway officials. Block pavements are generally considered superior to sheet pavements. 2 ill., 2,800 words. Municipal Journal, May 4, 10 cts.

Assessing Paving Costs. Assessing part or all of costs necessary if city is to be well paved. Methods employed in Utica and Portland. 1,500 words. Municipal Journal, May 25, 10 cts.

Aprons Reduce Flood Damage to Road Shoulders. Unprotected shoulders were washed away, but where concrete aprons were employed the slopes were not seriously damaged. By G. E. Schaefer. 1 ill., 1,200 words. Engineering Record, May 20, 10 cts.

Cost of Engineering Supervision in Road Work. Based on inquiries addressed to state road officials; data secured from 18 states. By Lamar Cobb, State Engineer of Arizona. 1,200 words. Engineering and Contracting, May 17. 10 cts.

SEWERAGE AND SANITATION.

Treatment:

Sewage Treatment Plant at Rochester, N. Y. Will treat part of the sewage of that city by Imhoff tanks prior to discharging it into Lake Ontario. Describes points in the design and construction of the plant. 3 illus., 1,800 words. Municipal Engineering, May. 25 cts.

Reinsch-Wurl Sewage Screen at Long Beach, Cal. Sewage is passed through a bar screen and a Reinsch-Wurl screen. Screenings are burned in an incinerator in the screen house and the sewage discharged in the ocean. By E. A. Rowe. 3 illus., 1,200 words. Engineering News, May 4. 15 cts.

Small Sewage Pumping Station for Park Site. Centrifugal pumps in duplicate serve districts of 2,000 population in Westchester, Pa. Float-switch controls automatically the stopping and starting of the motors. Artistic appearance of structure an important consideration. By W. D. Vosbury. 2 illus., 1,250 words. Engineering Record, May 6. 10 cts.

Activated Sludge Process on Stockyards Sewage. Chemical observations on experiments with two 200-gallon fill-and-draw tanks and a 30,000 to 100,000 gallon continuous flow 4-unit installation. Continuous flow more economical but has same advantages. Packingtown sewage was completely oxidized and well clarified. Absolute stability of effluent was reached in cold weather. 1,200 words. Engineering News, May 15. 15 cts.

Sewage Screening and Sludge Burning Plant Prevents Seashore Nuisance. At Long Beach, California, sewage passes revolving screen. Effluent is discharged into the ocean and sludge is reduced in an oil-burning incinerator. Pumping plant installed to take care of sewage during high tide. 4 illus., 2,000 words. Engineering Record, May 20. 10 cts.

Activated Sludge Experiments at Milwaukee. Further facts concerning the process brought out by the experimental work carried on at Milwaukee during 1911. Some very interesting charts accompany the article. By R. O. Wynne-Roberts. 3 illus., 3,000 words. Canadian Engineer, May 25. 15 cts.

Experimental Studies of Strawboard Waste Purification. Describes process of manufacture, present method of disposal and results of experiments now being made. By H. B. Hommon. 5,000 words. Engineering and Contracting, May 24. 10 cts.

Results of First Year's Experiments with Small Sewage Treatment Plants by U. S. Public Health Service. Discusses design of Imhoff tanks under the following points: Volume and proportions of settling chamber, inclination of partition walls, scum boards, clearance and overlap of slot, treatment of grease and volume of sludge chamber. Experimental results and conclusions. 3,500 words. Engineering and Contracting, May 3. 10 cts.

Sewers:

Segmental Sewer in Oakdale. Building a 57-inch sewer on a curve with a 20-foot radius. Describes the method of handling the wet ground and of constructing junctions and manholes. By G. D. Crain, Jr. 1 ill., 2,500 words. Municipal Journal, May 11. 10 cts.

Steel Aqueduct for Sewer. Curious method of carrying sewer in San Antonio. 3 illus., 300 words. Engineering News, May 11. 15 cts.

Sewer House Connections. Leaking joints in these are responsible for much ground water in sewerage systems. Method of making tighter joints. From an article by C. G. Wigley in the Cornell Civil Engineer. 1,500 words. Municipal Journal, May 18. 10 cts.

Miscellaneous:

Sewage Pumping in Boston. Method of conducting sewage of the metropolitan districts to the Calf Pasture. Description of plant and cost of operation. 1,100 words. Municipal Journal, May 4. 10 cts.

Electric Drive Replaces Steam for Drainage Pumps. To realize maximum efficiency two speeds are provided for by new motors and chain belts at Illinois plant. By E. J. Hegerty. 2 illus., 1,500 words. Engineering Record, May 15. 10 cts.

Plans Outlined for Abating Boundary

Water Pollution. Dilution of four sec.-ft. required for discharge of untreated sewage. 1,000 words. Engineering Record, May 20. 10 cts.

Tests of Effect of Method of Bending Upon the Supporting Strength of Drain Tile and Sewer Pipe. Results at Iowa State College. By N. J. Schlick. 9 illus., 2,500 words. Canadian Engineer, May 18. 15 cts.

Texas Sewage Works Activity. New law now in force in the state causes great concern to the cities. 1,400 words. Engineering News, May 25. 15 cts.

WATER SUPPLY.

Water Supply:

Artesian Wells and Methods of Pumping Them. A discussion on the design, construction and operation of water supplies obtained from underground sources, particularly those from driven wells. Such supplies are permanent and failures are due to improper construction or operation and not to the underlying water-bearing strata. From a paper by J. D. Kilpatrick. 3,500 words. Canadian Engineer, May 4. 15 cts.

Water Supply of 500,000 Gallons Daily from River Springs. Replaces the previous supply from driven wells. 3 illus., 400 words. Engineering News, May 4. 15 cts.

Improving Schenectady's Waterworks. The second of two articles; this one describes the remodeled pumping station and its equipment of centrifugal motor-driven pumps for high and low service. 1,200 words. Municipal Journal, May 4. 10 cts.

The Kallispell Water Works System. Describes the pumping station and pumping units, the distributing system and meter installation. Pumping station was built last year. 1,500 words. Fire and Water Engineering, May 10. 10 cts.

Some Suggestions Pertaining to the Operation of Waterworks Plants. Extracts from a paper by John W. Toyne containing some valuable suggestions to those who have to do with the conduct of waterworks plants. 1,500 words. Canadian Engineer, May 11. 15 cts.

Increasing Waterworks Efficiency Under City Manager Government. Reports with reference to the water systems from eight cities under this form of government. 1,200 words. Engineering and Contracting, May 17. 10 cts.

Experiences Operating Miles City Water System During 45 Consecutive Days Below Zero. Meter troubles, frozen service, electric thawing, steam thawing, frozen mains and frozen hydrants. 1,800 words. Engineering and Contracting, May 10. 10 cts.

Winter Operation of Waterworks at Miles City, Montana. Discusses the troubles found in the operation of the water plant, particularly as to meters and pipe lines, in a severe winter in a cold climate. By G. C. Pruett, City Engineer. 2,000 words. Municipal Engineering, May. 25 cts.

Purification:

Filtration of Softened Water. The best way to remove suspended matter is to filter downward through sand. Never use a coagulant in boiler feed water. Several cases are cited in which a sand filter would have effected a large saving over sedimentation. By F. F. Vater. 2,000 words. Power, May 9. 5 cts.

Pipe Lines:

Building Los Angeles' Aqueduct Irrigation System. Development of irrigation a part of the new water system of Los Angeles. By B. A. Heinly. 1,500 words. Engineering News, May 18. 15 cts.

New Water Tunnel at Chicago. Wilson Avenue tunnel work. Description of methods of excavation and of mixing and placing concrete. New methods reduce costs. 9 illus., 3,300 words. Engineering News, May 25. 15 cts.

Review of the Records of Concrete Casing and Lining Steel and Wood Stave Pipe Siphons. Discusses methods of lining as with forms and with cement gun, concreting plant and methods on the Catskill Aqueduct. 4 illus., 3,000 words. Engineering and Contracting, May 3. 10 cts.

Handling Water Main Extension Projects at Washington, D. C. Gives set of instructions governing the making up of water main extension projects. 2,000 words. Engineering and Contracting, May 17. 10 cts.

Reservoirs:

Huge Circular Reservoir in Dubuque Protects Congested-Value Business District. Description of 750,000-gallon reservoir and considerations governing its design. Selection of site saves city \$80,000. Bent slabs to carry stresses to

the rock through buttresses. Small leaks were stopped with ironite and cement. By D. H. Maury. 4 illus., 3,500 words. Engineering Record, May 6. 10 cts.

Covered Reinforced Concrete Reservoir at Hibbing, Minn. Describes recent small installation. By R. E. McDonnell. 2 illus., 500 words. Engineering News, May 25. 15 cts.

Excavation for the Baldwin Reservoir, Cleveland. Methods used in excavating 746,000 cubic yards of rock. Engineering News, May 4. 15 cts.

Miscellaneous:

Discharge from Vertical Pipes. Discussion and chart designed to compute the discharge from vertical pipes, devised by the author. The formula was made public in 1884 and has not been superseded by anything that can be considered an improvement. By C. E. Grunsky. 1 ill., 1,000 words. Canadian Engineer, May 25. 15 cts.

Watershed Forestation. Cultivation and protection of watershed from fire. Cost of lumbering, methods of forestation and fire protection. 3 illus., 1,250 words. Fire and Water Engineering, May 3. 10 cts.

Experiments on Water Flow Through Pipe Orifices. Coefficients for thin orifices of various types and for cap orifices are given. By Horace Judd. 6 illus., 3,000 words. Power, May 9. 5 cts.

LIGHTING AND POWER.

Lighting:

Modern Street Lighting at Providence, R. I. A complete system of street lighting using both the ornamental luminous arc and the mazda C lamps has been installed and is maintained at a high point of operating efficiency. This article describes how the different sections are lighted and how the system is patrolled. By Samuel D. Swan. 17 illus., 3,500 words. Lighting Journal, May. 10 cts.

Milwaukee's New Municipal Street Lighting System. To secure uniform illumination by the use of reflectors considerable elevation of lamps and systematic spacing were adopted. More than three times as much light is obtained for 42 per cent. more annual expenditure. By F. H. Bernhard. 9 illus., 3,000 words. Municipal Journal, May 11. 10 cts.

Milwaukee's New Municipal Street Lighting System. Second article. This describes details of underground circuits and lamp transformers. Extent and cost of proposed installation and estimate of operating costs. By F. H. Bernhard. 4 illus., 2,000 words. Municipal Journal, May 18. 10 cts.

The Municipal Lighting Plant of Detroit, Mich. Describes the details of the main station and lists the equipment belonging to the plant. 2 illus., 2,000 words. Municipal Engineering, May. 25 cts.

Street Lighting by Indeterminate Contracts. Outline of plan on the cost-of-service basis by which the municipality assumes responsibility for the operating company's special investments. 4,000 words. Electrical Review, May 6. 10 cts.

Selling Municipal and Highway Lighting. 35,555 miles of national highway, if lighted, would afford central stations an annual income of \$5,000,000. Other big fields available. By T. F. Kelly. 5 illus., 2,500 words. Electrical Review, May 20. 10 cts.

Miscellaneous:

General Electric Oil Engines for the U. S. Government. A high compression engine of the opposed-piston type running at 500 r.p.m., weighing 105 pounds per h.p. and embodying several novel features. 13 illus., 2,500 words. Power, May 23. 5 cts.

Electric Service to Interconnected Illinois Towns. Stages in the development of Illinois properties which serve 204 cities and villages. Economies effected by operation of few generating stations and by unit management. 12 illus., 5,000 words. Electrical World, May 20. 10 cts.

Electricity in Raw-Water Ice Making. A discussion of the advantages of raw-water ice over the natural product and some valuable data on the electrical operation of plants. By C. J. Carlsen. 10 illus., 7,000 words. Electrical Review, May 20. 10 cts.

Diagram for Full Comparison of Hydraulic Turbines. A new form of efficiency-contour diagram is developed, using proportionate speeds and powers, referred to speed and power at maximum efficiency, instead of absolute quantities, as has been customary. By R. E. Horton and W. C. Pomeroy. 3 illus., 4,200 words. Engineering News, May 25. 15 cts.

FIRE AND POLICE.

Protection:

The Tulsa Fire Department. Describes apparatus and equipment in service and gives an abstract of the annual report of the department. 2 ills., 1,200 words. Fire and Water Engineering, May 10. 10 cts.

The Oklahoma City Fire Service. Report of National Board of Fire Underwriters. 3,000 words. Fire and Water Engineering, May 10. 10 cts.

Apparatus:

Motor Apparatus Specifications. General provisions, requirements, construction, delivery and tests for two common types of automobile combination cars. 7,000 words. Fireman's Herald, May 13. 5 cts.

Operation of Motor Fire Apparatus in Winter. 12 chiefs from the larger cities in the northern part of the United States report motor apparatus useful and efficient in the most severe weather. 1,000 words. Fire and Water Engineering, May 10. 10 cts.

Police:

Flashlight Police Signal System. Experience in Louisville, Ky. Description and mode of operation of system which tends to prevent crime as well as to catch criminals. By G. D. Crain, Jr. 1,200 words. Municipal Journal, May 25. 10 cts.

Miscellaneous:

New York Fire College Extension Course. Questions presented and answers thereto as officially promulgated to members of the department. Fireman's Herald, May 6, 13, 20 and 27. 5 cts. each.

Fire Record of the Cities. 96 places of 20,000 inhabitants or over had less than \$1 per capita loss in 1915. 25 exceeded \$5 per inhabitant. Interesting statistics for 335 cities. 2 1/2 pages. Fireman's Herald, May 27. 5 cts.

MOTOR VEHICLES.

The Utilization of the Motor Truck in Highway Work. Describes several places where the motor truck has been used to advantage in road construction and gives costs in some cases. 22 ills., 7,000 words. Good Roads, May 1. 10 cts.

Motor Trucks for Hauling Materials for Road Construction. Records showing what various trucks are accomplishing in contractors' service. 5 ills., 3,000 words. The Contractor, May 15. 20 cts.

Cost of Hauling Gravel by Team and by Tractor. Data presented and conclusions suggested are derived from records on 5 team-hauling jobs and one tractor-hauling job. From a paper by O. L. Kipp. 1,750 words. The Contractor, May 1. 20 cts.

Motor Trucks for Hauling Materials for Road Construction. A discussion of the fundamentals of truck operation with comments on size and types of trucks for contractors' use. Also discusses trailers, rate of travel and loading and unloading. 4 ills., 2,500 words. The Contractor, May 1. 20 cts.

Efficient Gravel Hauling by Motor Truck on City Work. Detailed record of truck operation, showing saving made by systematic planning and rapid loading. 4 ills., 4,000 words. The Contractor, May 1. 20 cts.

Electrical Commercial Vehicles in Cincinnati. Successful operation of electricity in a typical hilly community gives evidence of their ability to give satisfaction regardless of road conditions. By C. E. Ogden. 3 ills., 1,500 words. Electrical Review, May 20. 10 cts.

Motor, Fire and Other Vehicles in Cities. Rapid increase in their use by municipalities during the past two years. Since that time the pieces of fire apparatus has more than doubled in number. 1,000 words. Municipal Journal, May 11. 10 cts.

CITY PLANNING.

City Planning at Cebu. Many streets and most of the lots were rearranged. A scale of values was used in rearranging the lots. By R. S. Hardman. 2 ills., 1,700 words. Engineering News, May 11. 15 cts.

Width and Allocation of Space in Roads. Extracts from a paper before the Town Planning Institute. The author discusses the factors which should determine the width of roads, main streets, secondary streets, etc. By F. L. Thompson. 3,000 words. Canadian Engineer, May 25. 15 cts.

Streets and the City Beautiful. A large proportion of the area of every city is covered by streets. This article points out the lines along which attention must be paid in the design and

construction of streets. By D. T. Pierce. 9 ills., 1,000 words. Municipal Engineering, May. 25 cts.

TRAFFIC.

Systems of Traffic Control. Conflicting interests of vehicles, foot passengers and property owners. Left-hand turns; safety zones; circles and rotary traffic at intersections; traffic semaphores and one-way streets. By H. C. Hutchins. 4 ills., 3,000 words. Municipal Journal, May 25. 10 cts.

BRIDGES, DAMS AND RETAINING WALLS.

Bridges:

Design and Construction of a Through Arch Reinforced Concrete Bridge at Kristianstad, in Sweden. With comparative data on the design of the Lyons Falls bridge of New York. By A. M. Wolf. 2 ills., 3,000 words. Engineering and Contracting, May 17. 10 cts.

Experience and Costs in Making Concrete Bridge Units. Details of the casting of the members for a unit-built concrete bridge. Casting yard was exceptionally well laid out. Special measures were required in making floor units. By H. M. Holmes. 4 ills., 1,900 words. Engineering News, May 4. 15 cts.

How a Concrete Arch is Being Built Under a Steel Bridge. This article shows how unfavorable conditions have been overcome by efficient plant and careful planning. Work was done without interfering with heavy railroad traffic. By D. J. Hauer. 3 ills., 2,200 words. The Contractor, May 15. 20 cts.

Design of Masonry and Concrete Arches. Discusses the advantage of the ideal arch over the circular arch; horizontal pressure on the arch ring; backing or filling. 2 ills., 2,500 words. Canadian Engineer, May 18. 15 cts.

Highway Bridge Development in Ontario. A paper descriptive of bridges in Ontario which come under the supervision of the Ontario Highways Department. By Geo. Hogarth. 6 ills., 3,000 words. Canadian Engineer, May 4. 15 cts.

Methods and Cost of Constructing a Small Bridge Pier in the Potomac River. Gives a detailed description of a small job. By Elliott Vandevanter. 3 ills., 3,500 words. Engineering and Contracting, May 24. 10 cts.

Truss Deflections Accurately Determined by Angle Changes and Elastic Weights. Different methods explained and compared. Practical formulas and diagrams designed to save time are illustrated by examples. By G. B. Steinman. 4 ills., 3,500 words. Engineering Record, May 13. 10 cts. 4 ills., 2,500 words. Engineering Record, May 20. 10 cts.

Well Balanced Mixing Plants Pour Dense Concrete from High Towers on Long Highway Bridge. Carpenter work sets the pace on the Baltimore structure where pier sites were excavated and piles driven and cut off before steel coffer were built. 40,000 yards of concrete require 2,485 tons of reinforcing steel. 6 ills., 3,000 words. Engineering Record, May 13. 10 cts.

Corrugated Culvert Pipes Tested Under a Sand Bed. Box with movable sides and 100-ton jacks employed. Arching effect of sand discussed. By Geo. L. Fowler. 1 ill., 2,000 words. Engineering Record, May 27. 10 cts.

Tests Show Strength of Corrugated Culvert Pipe. Formula for working pressure developed from results of crushing pipe by external hydrostatic pressure. By G. L. Fowler. 4 ills., 1,500 words. Engineering Record, May 20. 10 cts.

Dams:

Building a Big Dam in the Wilds. Design of a 70,000-cu. yd. masonry dam to impound 160,000,000,000 cu. ft. of water. Difficulties of getting material and handicaps of winter weather. 7 ills., 3,600 words. Engineering News, May 11. 15 cts.

Retaining Walls:

Retaining Walls on Bathurst Street Hill, Toronto. A discussion on the design and construction of these retaining walls, which were built to improve the road and provide better access to the rapidly-growing section of the city. By S. G. Talman. 6 ills., 2,000 words. Canadian Engineer, May 18. 15 cts.

MATERIALS OF CONSTRUCTION.

Results of Some Tests of Douglas Fir Bridge Stringers to Determine Effects of Creosote Treatment on Physical Properties. Discusses methods of mak-

ing tests, results and conclusions. 2 ills., 4,000 words. Engineering and Contracting, May 10. 10 cts.

Slag Portland Cement. Advocates the manufacture of slag portland cement, although it is not as good as the best portland cement. From a paper by B. J. Day. 1,250 words. Canadian Engineer, May 18. 15 cts.

Wearing Tests for Sand and Gravel. Describes the tests for the two materials, gives results of tests already made and considers satisfactory results. By F. L. Roman. 2,500 words. Good Roads, May 1. 10 cts.

Pressure of Wet Concrete on the Sides of Column Forms. Experiments at University of Illinois. Tests on built-up laboratory columns and on posts in bridge under erection. By A. B. McDaniel and N. B. Garver. 6 ills., 2,800 words. Engineering News, May 18. 15 cts.

MISCELLANEOUS.

Kind and Capacity of Concrete Plants for Contractors. The third of a series of articles. This deals with the capacity of mixers and with the type of mixing plant to use, comparing single units with a central plant. 2,500 words. The Contractor, May 15. 20 cts.

Devising a System for Carrying on Construction. An article dealing with the essentials of a system for carrying on contract work in the engineering construction field. The article shows what a system is and how it can be built up to make an organization more efficient. By D. J. Hauer. 2,500 words. The Contractor, May 15. 20 cts.

Steam Shovel Work on Ashokan Reservoir. Method, organization and plant for excavating and handling more than 10,000,000 yards of earth and building 8,000,000 yards of high-class embankment. 6 ills., 1,800 words. Contracting, May. 10 cts.

New Chicago Municipal Recreation Pier. Construction and electrical features of large pier which is illuminated with 10,000 lamps and has a power installation of 1,000 h.p. 7 ills., 1,200 words. Electrical Review, May 20. 10 cts.

Test of Mushroom Flat Slab in Seattle Warehouse Shows High Local Stresses. Official investigation of building by extensometer measurement under live loads carried to 1.1 times the design load. By D. E. Hooker. 6 ills., 3,000 words. Engineering Record, May 13. 10 cts.

Extensometer Tests on Three Types of Concrete Floors. Tests on completed concrete buildings by the Seattle Building Department. 1,800 words. Engineering News, May 25. 15 cts.

Mechanical Tamping of Trench Back-Fill. Describes jobs on which mechanical tamper has been used and gives comparative costs of hand and machine methods. By C. W. Wilson. 5 ills., 2,000 words. Municipal Engineering, May 25 cts.

Machines for Building Levees. Description and cost data of machines recently constructed to build levees for Mississippi river. By J. R. Slattery. 3 ills., 3,600 words. Engineering News, May 25. 15 cts.

Memphis Flood Protection. Description of new levees at Memphis, Tenn. Concrete core walls are used, and drainage is pumped down from behind levees. 9 ills., 4,000 words. Engineering News, May 11. 15 cts.

Small Check Dams, in Series, Lessen Flood Velocities in California Ravines. Experiments prove the value of obstructions in channels where floods originate. By H. F. Olmsted. 4 ills., 2,000 words. Engineering Record, May 13. 10 cts. Test Results Lead to Prediction that Unit Obstructions Will be a Big Factor in Future Flood Control Plans. 4 ills., 1,500 words. Engineering Record, May 20. 10 cts.

The Legislative Control of the Engineering Practice. In this paper the writer discusses legislation as affecting the status of the civil engineer; quotes the provisions of certain acts governing the licensing of civil engineers. By G. N. Houston. 3,000 words. Canadian Engineer, May 11. 15 cts.

Engineer's Work Puts Community Building on Sound Economic Basis. Chambers of Commerce should base their industrial work on thorough engineering investigations. By J. Z. George. 2,000 words. Engineering Record, May 6. 10 cts.

(Continued on page 809.)

NEWS OF THE SOCIETIES

Calendar of Meetings.

June 5-9. AMERICAN WATER WORKS ASSOCIATION. Thirty-sixth annual convention, Hotel Astor, New York City. Secretary, J. M. Diven, 47 State street, Troy, N. Y.

June 6-10. INTERNATIONAL ASSOCIATION OF POLICE CHIEFS. Twenty-third annual convention, Robt Treat Hotel, Newark, N. J.

June 12-16. SOUTH DAKOTA STATE FIREMEN'S ASSOCIATION. Annual convention, Yankton, S. D.

June 13-15. MINNESOTA STATE FIRE DEPARTMENT ASSOCIATION. Annual convention, Chisholm, Minn.

June 14-16. UNION OF SASKATCHEWAN MUNICIPALITIES. Annual convention, Swift Current, Sask. Secretary, W. F. Heal, Moose Jaw, Sask.

June 14-17. AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Eighth semi-annual meeting, Cleveland, O. Secretary, I. C. Olsen, Cooper Union, New York City.

June 15, 16. OHIO SOCIETY OF MECHANICAL, STEAM AND ELECTRICAL ENGINEERS. Convention, Cleveland, O. President, Joseph L. Skeldon, Toledo.

June 20-22. NORTH CAROLINA GOOD ROADS ASSOCIATION. Annual convention, Wilmington, N. C. Secretary, Dr. Joseph Hyde Pratt, Chapel Hill, N. C.

June 20-22. SOUTH CAROLINA STATE FIREMEN'S ASSOCIATION. Annual convention, Orangeburg, S. C.

June 21-23. TRI-STATE WATER AND LIGHT ASSOCIATION OF THE CAROLINAS AND GEORGIA. Annual Convention, Isle of Palms, S. C. Secretary-treasurer, W. F. Stieglitz, Columbia, S. C.

June 27-30. IOWA STATE FIREMEN'S ASSOCIATION. Annual convention, De Witt, Ia.

June 27-30. AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual meeting, Pittsburgh, Pa. Secretary, Charles Warren Hunt, 220 West 57th St., New York, N. Y.

June 27-30. AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting, Atlantic City, N. J. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

June 28, 29. NEW YORK STATE ASSOCIATION OF FIRE CHIEFS. Annual convention, Elmira, N. Y. Secretary, Henry R. Yates, Schenectady, N. Y.

June 28-30. MICHIGAN LEAGUE OF MUNICIPALITIES. Annual meeting, Battle Creek, Mich.

July 5-6. GEORGIA STATE ASSOCIATION OF CHIEFS OF POLICE AND MARSHALS. Annual convention, Savannah, Ga. Secretary, J. P. Griffin, West Point, Ga.

July 11-13. MUNICIPAL LEAGUE OF INDIANA. Annual meeting, Goshen, Ind.

July 25-27. CENTRAL NEW YORK VOLUNTEER FIREMEN'S ASSOCIATION. Annual convention, Seneca Falls, N. Y. Secretary, Stewart W. Smythe, Cortland, N. Y.

Aug. 7-9. CITY MARSHALS' AND POLICE CHIEFS' UNION OF TEXAS. Annual convention, Houston, Tex.

Aug. 8-10. OHIO POLICE CHIEFS' ASSOCIATION. Annual convention, Cedar Point, O. Secretary, Ex-Chief James Stamberger, E. Cleveland, O.

Aug. 8-11. DOMINION ASSOCIATION OF FIRE CHIEFS. Annual convention, Windsor, Ont. Secretary, James Armstrong, Kingston, Ont.

Aug. 21-27. PACIFIC COAST ASSOCIATION OF FIRE CHIEFS. Annual convention, San Diego, Cal.

Aug. 28-31. NATIONAL TAX ASSOCIATION. Tenth annual conference, Indianapolis, Ind.

Aug. 29-31. LEAGUE OF CITIES OF THIRD CLASS IN PENNSYLVANIA. Seventeenth Annual Convention, Johnstown, Pa. Secretary, Fred H. Gates, City Clerk, Wilkes-Barre, Pa.

Aug. 29-Sept. 1. INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Annual convention, Providence, R. I. Secretary, James McFall, Roanoke, Va.

Sept. 6-9. LEAGUE OF AMERICAN MUNICIPALITIES. Annual convention, Newark, N. J.

Sept. 4-8. SOUTHERN APPALACHIAN GOOD ROADS ASSOCIATION. Ninth annual convention, Lexington, Ky. Secretary, Dr. Joseph Hyde Pratt, Chapel Hill, N. C.

Sept. 13-15. NEW ENGLAND WATER WORKS ASSOCIATION. Convention, Portland, Me. Secretary, Willard Kent, Narragansett Pier, R. I.

Oct. 9-13. AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS. Twenty-third Annual Convention, Robert Treat Hotel, Newark, N. J. Secretary, Charles Carroll Brown, 702 Wulsin Building, Indianapolis, Ind.

Oct. 16-21. NATIONAL SAFETY COUNCIL. Fifth Annual Safety Congress, Detroit, Mich. Secretary, W. H. Cameron, Continental and Commercial Bank, Chicago, Ill.

Feb. 5-12, 1917. AMERICAN ROAD BUILDERS' ASSOCIATION. Seventh American Good Roads Congress and Eighth National Good Roads Show, Mechanics' Hall, Boston, Mass. Secretary, E. L. Powers, 150 Nassau street, New York City.

Conference of Mayors and Other City Officials of the State of New York.

The seventh annual conference of this organization was held in Syracuse on May 31 and June 1 and 2. At the same time and place there was held the eleventh annual convention of the National Association of Comptrollers and Accounting Officers, and three of the six sessions which each society held were joint sessions of the two. About one hundred and twenty-five city officials were registered, and there was at least one from each city in the state. The time from the opening up to Friday noon was devoted exclusively to the reading and discussion of papers and business of the conference; the entertainment by the city being in the form of a smoker after the evening session Wednesday, luncheons Thursday and Friday between the morning and afternoon sessions, and a shore dinner following adjournment on Friday.

The officials elected for next year were: Cornelius F. Burns, mayor of Troy, president; Walter R. Stone, of Syracuse, vice-president; Joseph W. Stevens, of Albany, was re-elected treasurer, and William P. Capes was reappointed secretary. James T. Lennon of Yonkers, D. W. Wilber of Poughkeepsie, H. Clayton Midlam of Troy, James R. Cline of Amsterdam and Palmer Canfield, Jr., of Kingston were appointed State Municipal Bureau Council. The conference will be held in Buffalo next year.

On Wednesday afternoon, following addresses by city and society officials, a paper, entitled "The State and the Municipality," was read by Francis M. Hugo, secretary of state of New York. In the evening Mayor Hoffman of Elmira presented the report of a committee on reducing the number of unemployed men in cities, recommending that municipalities so regulate their public works that while private employers are operating on reduced bases, the cities will be able to extend their public works and keep the number of unemployed down to a minimum. Mayor Lennon of Yonkers reviewed the work

done by the municipal information bureau of the council, through which the cities co-operate to secure municipal data, stating that the success of the bureau had been much greater than had been anticipated or even hoped. State deputy comptroller Reusswig presented a plan for uniform accounting of the third class cities of the state.

On Thursday morning T. Chalkley Hatton described the latest results and conclusions from the tests on activated sludge sewage disposal being conducted at Milwaukee. This paper and the discussion of it by Glenn D. Holmes and John A. Giles appear elsewhere in this issue.

Dr. Lindsey Williams, deputy health commissioner of the state, read the other paper of the morning, advocating uniformity in municipal health budgets, and keeping separate cost accounts of the several functions such as infant welfare, pure food and other classes of work, permitting comparisons between cities. Dr. Hicks, health officer of Amsterdam, stated his belief that health boards should have control of all matters affecting health in any degree, such as garbage collection and street cleaning—an opinion with which few of the more progressive of even health officers agree. At this session the compensation law as it applies to municipal employees was discussed and action was promised looking to early decision by the courts as to its validity and scope.

Thursday afternoon Martin Saxe, president of the state tax commission, under the head of "Exemptions of Real and Personal Property from Taxation," made a vigorous attack on organized methods by which corporations evade taxes and throw most of the burden on the small home owner, and declared the duty and purpose of the commission to tax personal as well as real property. He stated that if exempt realty paid taxes it would yield sufficient to run the entire state government. Following this, Dr. John Finley, state commissioner of education, made a plea for greater co-operation between state and local school boards, and a full realization of the responsibility of the local boards directly to the voters, and not to any city council or commission.

In the evening Dr. Edward A. Fitzpatrick, director of the Society for the Promotion of Training for Public Service, pointed out the responsibility resting upon public officials for the proper training of men in public service and especially in an appreciation of the moral obligations and duties to their cities. Edward S. Osborne, comptroller of Rochester, explained the proposed uniform bond law for the state, advocating short-term notes for permanent improvements, to be taken up later by bond issues. He believed that the Rochester charter "with reference to borrowing embodies everything that is good and few, if any, of the things that are bad."

Friday morning two papers were read, one by A. Prescott Folwell, chairman of the Committee on Standard Forms of the American Society of

Municipal Improvements and editor of Municipal Journal, on "Standard Units for Comparing Municipal Improvements," which was discussed by city manager O. E. Carr of Niagara Falls and Mayor Palmer Canfield of Kingston (this paper is abstracted elsewhere); the other paper a description by Lawson Purdy, president of the department of taxation and assessment of New York City, describing what New York is doing towards such restriction and districting after the German method.

Resolutions were introduced and passed for the enactment of uniform traffic laws in all cities of the second and third classes; for the extension of home rule for cities; for the modification of the election laws to reduce the expense to the cities; for the consolidation of the educational laws of the state; for the appointment of a committee to co-operate with the state tax commission; for the promotion of legislation to curb the extension of tax exemptions on real property, and for more rigid taxation of personal and corporate property; for the elimination of all toll bridges in the state, and the report of the Committee on the Reduction of the Number of Unemployed in the Cities was adopted; for the appointment of a committee to confer with the Committee on Standard Units of the American Society of Municipal Improvements with a view to recommending the adoption of such units by the cities of the state.

A resolution advocating a state law for local option by small municipal units was tabled after the most spirited discussion of the convention.

National Electric Light Association.

The thirty-ninth convention of the National Electric Light Association was held at the Auditorium and Congress hotels, Chicago, on May 23 to 26. Twenty-three sessions were held at which there were presented upwards of 90 reports, papers and addresses. Four of these involved matters of considerable interest to municipal authorities and are briefly summarized below.

The report of the Committee on Street Lighting consisted largely of a review of the purpose of street lighting and its essential technical principles. Many points were discussed upon which there has been as yet no general agreement by street lighting engineers, such as the relative values of uniform and silhouette illumination, proper direction of light, etc. The necessity for eliminating glare from powerful light sources was emphasized and two ways of decreasing it were described: these are by high mounting of lamps and by use of diffusing globes. Respecting character of circuits, the committee pointed out the growing tendency to extend underground circuits from the business districts to the outskirts of a city, but suggested that the neat building and proper maintenance of overhead circuits would reduce the call for putting them underground.

In the report of the Committee on Commercial Aspects of Municipal and highway Lighting it was pointed out that the increased efficiency of lighting units now available makes practical a much more thorough lighting of streets at little, if any, increase in cost. Lighting companies should take the lead in recommending improvements made possible by developments in the art. The system should be laid out according to some definite and carefully studied engineering plan, instead of placing lamps here and there at random or according to the notions of some official who has no knowledge of illumination requirements. A trial installation of a modern, efficient system usually results in convincing city authorities of the economic and civic value of greatly improved street lighting. Of so-called ornamental lighting systems, the committee reported that simple units with either magnetite arc or gas-filled tungsten lamps are much more economical and generally desirable than cluster posts. The varied character, irregularity and poor maintenance of most merchants' private post systems was pointed out and uniformity of equipment and systematic upkeep recommended throughout each city. It was suggested that best results are obtained when the city pays for the operation and maintenance of such ornamental systems. But little has as yet been done in highway lighting except along short sections of the Lincoln and other prominent national highways and on short portions of county or township roads in New York, New Jersey, Ohio and southern California. The importance of highway lighting is increasing with the rapid growth of traffic.

The Committee on Electrical Advertising reported, among other things, on the value of municipal night advertising. The earliest form of this was by means of electrically lighted slogan signs, which were usually installed free by the lighting companies. During the past year the value of flood lighting of public buildings has been strikingly demonstrated in several instances. As a rule, these are imposing structures whose architectural beauty is entirely lost at night. By completely flooding the building exteriors with light thrown from a relatively small number of projector lamps the building is very effectively and economically illuminated.

In the report of the Committee on Sub-Surface, Municipal and Other Construction, the advantages of electric over steam power in construction work were set forth. It was shown that electric power in being increasingly used in the erection of buildings and in the execution of many very important public undertakings, such as the Kensico dam near New York City for a larger water reservoir, the 20-mile rock tunnel of the Catskill Aqueduct, the Mount Royal tunnel at Montreal, the Philadelphia subway, the Chicago Municipal Pier, numerous irrigation projects in the West, etc. Several tests

of electric motor drive for operating air compressors, hoists, concrete mixers, pumps, etc., were given. One test showed that direct electric drive of a group of hoists, drills and pumps required only 28 per cent. of the power used when these machines were operated by compressed air, the air compressors in the latter case being motor driven.

The total N. E. L. A. enrollment at the time of the convention was 14,983, compared with 13,448 last year. Election of officers resulted as follows: President, H. A. Wagner, Baltimore; vice-presidents, W. F. Wells, Brooklyn, R. S. Orr, Pittsburgh, R. H. Ballard, Los Angeles, and Alex. Dow, Detroit; treasurer, W. H. Atkins, Boston; executive committee, M. R. Bump, New York, Martin Insull, Chicago, and Walter H. Johnson, Philadelphia.

Utah Public Health Association.

To promote public health and sanitation measures throughout the state, the Utah Public Health Association was formally launched at a meeting held at Salt Lake, May 19. E. O. Howard was elected president of the society; Heber J. Grant, first vice-president; Mayor A. R. Heywood of Ogden, second vice-president; William J. Deeney, secretary, and Horace H. Smith, treasurer. H. G. Merrill, of Provo, was elected assistant secretary and treasurer. Governor William Spry and United States Senator Reed Smoot were elected honorary vice-presidents of the organization.

An executive committee was appointed, with the following membership: Dr. T. B. Beatty, Mrs. Arthur H. S. Bird, Mrs. James Canse of Ogden, Mrs. E. E. Corfman of Provo, Dr. E. G. Gowans, E. G. Peterson, president-elect of the Utah Agricultural College, and Miss Kate Williams.

National Conference of Charities and Correction.

Indiana celebrating its centennial drew the National Conference of Charities and Correction to Indianapolis for its convention, held May 10-17. A record-breaking attendance met at the conference—a total of 3,150, including 1,600 from outside the state.

In addition to the main conference, there were a great many preliminary meetings of various organizations dealing with special activities of social work. Among these were the American Association of Societies for Organizing Charity, the National Conference on the Education of Dependent, Truant, Backward and Delinquent Children, the American Association of Officials of Charity and Correction, the National Children's Home Society, the American Association for the Study of the Feeble-minded, the National Probation Association and the newly-formed International Association of Policewomen. The Tri-State Housing Institute of Indiana, Illinois and Ohio held a conference on the questions of housing, health and city-planning laws and law enforcement. Among the new or-

ganizations was one of medical social workers.

A report of a special committee of the main conference proposes the absorption of the independent groups into the big program. A postal canvass is to be made of the members to secure a new name for the conference. For the next meeting efforts will be made towards unity by choosing one theme for the general sessions of all committees so as to emphasize "underlying causes."

Alcoholism in its public health and industrial aspects was covered by a committee of which the chairman was Bailey B. Burritt, of New York. Dr. Haven Emerson, New York City's commissioner of health, declared that 2,000 deaths a year in that city are directly caused by drink, besides the much larger but less easily ascertained number of deaths in which it is an indirect factor. He even went so far as to advocate the use of the police power to curb "old demon rum." The attitude of insurance companies toward drinking habits was detailed by Arthur Hunter, actuary of the New York Life Insurance Company. He presented statistics and the consensus of opinion he had secured from the medical directors of the leading companies, covering five questions. The attitude of large employers toward the use of alcohol by their employes was described by Alexander Fleisher, of the welfare division of the Metropolitan Life Insurance Company. His study covered fifty employers of 750,000 individuals. Ten railroads, with 400,000 employes, indicated their opposition to the use of intoxicants, whether the employe was on or off duty. Public service corporations prohibited the use of alcohol during working hours. The National Safety Council has declared that drinking is productive of a heavy percentage of accidents.

There was a decided tendency in the conference toward the transferring of welfare activities from private to public agencies, and the general favoring of municipalization at Indianapolis was significant. This was brought out in the general session of the Committee on Public and Private Charities, under the chairmanship of H. H. Shirer. D. Frank Garland, director of the Department of Public Welfare of Dayton, urged that public authorities should take over the conduct of all proven methods for meeting social needs; and Frederic Almy, of the Buffalo Charity Organization Society, agreed that there should be turned over to the public all charitable work that the public is competent to do.

Mr. Almy went so far as to urge the ultimate provision of "free health." He declared that disease is more dangerous than ignorance and hoped that the day will come when rich and poor alike will send their children to the city physician just as they now send them to public schools. He said he had always favored widows' pensions administered by the public; and even cover-

ing charitable effort, which he did not consider the public yet competent to do, he was for a large and effective measure of public supervision. He pointed out, however, that there are some personal and delicate services which ought to remain in the hands of private charities, and that there are other activities of a pioneer nature which private agencies can carry through more effectively. On the score of the competency of the public agencies he reminded his hearers that although Buffalo has had a commission form of government since January 1, the overseer of the poor, who has always been publicly elected, is incompetent and unintelligent, never attends a national conference and does not so much as read books on social work. Mr. Garland described the public welfare activities of Dayton as established by the city's charter. He claimed that in a democracy the public should meet social needs, that the individuals' welfare is increasingly dependent on things which he can affect but slightly, but over which the community as a whole can exercise effective control. Public welfare, according to Mr. Garland, should share in budgets at least equally with protection of property.

Gertrude Vaile, executive of Denver's municipal charities, emphasized her unshaken faith in the public administration of charities, urging that it is the business of social workers to lead the community toward better administration of its service.

The work of the Committee on Unemployment, under William Pear, of Boston, continued its tendency from the short-sighted emergency relief measures to the intelligent, long-range measures for solving the problem. Fundamental methods were dealt with by William M. Leiserson, John R. Shillady and James Mullenbach. The first speaker proposed a "labor federal reserve board" with a national system of labor exchanges to regularize the labor market, devise methods of utilizing

public work to take up workers in slack periods, collect and disseminate information and work out methods of unemployment insurance. Mr. Shillady, secretary of the Mayor's Committee on Unemployment, New York City, discussed in detail the use of public work. He pointed out that in one year federal, state and municipal governments spend \$586,000,000 on permanent public improvements while in the same year the railroads spent on roads, rolling stock, machinery, etc., \$680,000,000. By organization a small part of this work could be reserved for periods of commercial crises to bring about steadiness of employment. Mr. Mullenbach suggested a "sifting station" for sifting out the unemployable from the employable laborers and discussed the inadequacy of the "wood-yard test."

In the general session arranged by the new committee on the promotion of social programs, the chairman, Graham Romeyn Taylor, emphasized organization of the community, all elements of the people, as the fundamental basis out of which social programs would grow, expressing not merely the thought of a selected group but of an educated popular desire. A handful of social workers, he said, could try to tell their city what it ought to do, but the program which will be carried out is the one that springs from effective community organization. He urged the importance of finding some way whereby socially created values may be utilized in meeting community needs, and cited Gary, Ind., as a striking demonstration of how much this value created by the community amounts to. A comparison recently made of the value of the land at the time the city was founded ten years ago with its present value indicates a dissipation among lucky private individuals, some of them non-residents, of nearly \$30,000,000, which could just as well now be in the possession of the community which created it. He concluded by urging the new point of view which is concerned not merely with prevention of social ills but with promotion of social well-being.

The most fundamental discussion of the organization of community forces came from Allen T. Burns, whose address on this topic was considered one of the features of the Indianapolis conference. Mr. Burns went straight to the essential democracy which he declared many social workers lack in their efforts to "put over" their own ideas of community needs instead of finding out what the community is thinking about, undertaking to educate the community from this starting-point, and resorting to political action to secure social advance.

Another paper which emphasized these same points concerning community organization was Shelby M. Harrison's illuminating description of the factors which make social surveys effective in revealing community needs,

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MUNICIPAL INDEX

(Continued from page 806.)

Stop Slides by Releasing Accumulated Water at Bulls Bridge Hydro-Electric Plant. Leakage from pond, a break in the canal banks and land slides occur at a small plant in Connecticut after several year's service. By C. R. Harte. 8 ills., 2,500 words. Engineering Record, May 27. 10 cts.

Filing and Indexing Drawings. Engineer Department, District of Columbia. Describes old system by which 1,300 drawings were filed and new system by which 5,000 drawings can be filed in the same space. 1,250 words. Engineering and Contracting, May 10. 10 cts.

The Use and Care of Explosives. Explosives enter so largely into the work of the engineer and engineering contractor that the article will be of great interest to them. It deals with the explosives themselves and also with the handling of them in actual work. By Dr. R. E. Somers. 14 ills., 3,000 words. Canadian Engineer, May 25. 15 cts.

Electrical Precipitation of Smoke and Dust. Experiments in the electrical precipitation of various materials in suspension. Constructing and operating problems in the design of a suitable treater. By H. P. Hill. 8 ills., 1,800 words. Electrical World, May 13. 10 cts.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

COMBINATION GRADER AND SCARIFIER.

For Road Construction and Repair Service.

"Two machines in one" is the claim made for the new Sandusky No. 1 combination road grader and scarifier. It is claimed not only to be able to do grading possible with any other grader, but that it can also scarify on jobs difficult for other scarifiers. The scarifier and blade can be used either separately or together and no change of machines is required for the two jobs. The economy of performing in one operation what is usually done in two is claimed to make possible substantial savings in building or repairing macadam or stone roads.

The weight of the machine is 6,600 pounds, so that it is heavy and strong enough to do practically any kind of grading. The scarifier is designed and built to loosen the hardest kind of macadam, not exceeding 8 inches. The blade is 9 feet long, 20 inches wide and may be reversed and extended. The blade shifts with the circle frame 16 inches either way from the center and also slides through the arms 14 inches either way from the center, making a total of 30 inches. This makes it possible for the operator to place the outside end of the blade in line with the scarifier. This feature is useful when filling trenches or throwing dirt over an embankment.

The scarifier teeth are of high carbon steel and made for long wearing. They are adjustable to five different pitches and are easily removed for

sharpening. There are no bolts in the scarifier and no nuts to get loose. The teeth are so shaped that they dig in naturally, consuming the least amount of power. In adjusting the teeth to the proper pitch the key is loosened with a hammer and the tooth drops out.

The adjustments are simple and only one man is needed to operate the machine. The steering gear is on the truck, not out on the pole. The machine is so designed that the lateral thrust is always on the rear axle.

The road grader and scarifier, which is shown in the accompanying illustration, is made by the Sandusky Road Machinery Company, Sandusky, O.

STREET CLEANING BROOMS.

Holcomb's Patented Brooms in a Number of Styles.

The principal characteristic of Holcomb's patented street brooms is their strength, pound for pound. While they are claimed to be extremely strong, yet they are so well balanced that they do not feel heavy or awkward. They are built to move the heaviest and most bulky dirt with ease.

The fibre is anchored in the block on a patented plan. The stock is first wired around a hard wood peg and the whole top is then cemented and nailed in the solid, hard wood block. Each block has two tapered staff holes and the handles cannot slip out. By changing the handle from side to side the brooms can be kept wearing evenly.

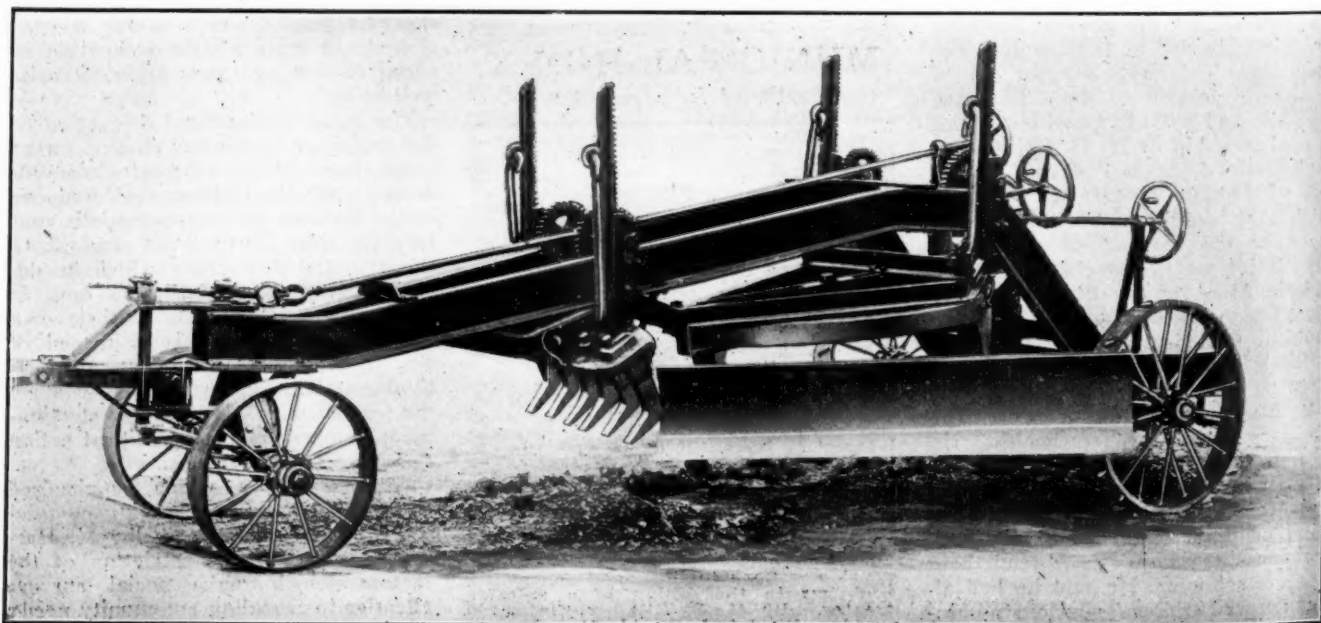
The end flare makes it possible to

sweep the gutters clean without rubbing the block against the curb. This lengthens the life of the broom as it prevents the end of the block from being "beat out" and split. The block is about 2½ inches from the curb when the fibre is touching. The brooms stand up under adverse weather conditions and the effect of water on them is very slight.

The bass fibre street brooms are made for a clean sweep and are strong enough to move "brick bats." They are especially good for use on fairly smooth surfaced streets. They hold shape in wet work, the African Bass fibre being practically impervious to water. The blocks are 2-inch hard wood with sanded finish. The bass fibre extends 6¼ inches out. This broom is made in two sizes: block, 3¾ x 13½; sweeping face, 4½ x 19; 12 bobs fibre; and block, 3¾ x 17½; sweeping face, 4½ x 22; 16 bobs fibre.

"Single row" bass fibre steel brooms are made for lighter work and are good equipment for carts and cans. The fibre is the same as in the other brooms, but there is one row of bobs instead of two. The blocks are much lighter and have one tapered staff hole. The two sizes are: block, 2x12 inches; sweeping face, 3½ x 18; 6 bobs fibre; block, 2x16; sweeping face, 3½ x 22; 8 bobs fibre.

Rattan street brooms are built for cobblestone and other very rough streets. They are naturally stronger than the other brooms and are designed especially for heavy work. The sizes are the same as in the bass fibre brooms. Special rattan brooms are



SANDUSKY COMBINATION ROAD GRADER AND SCARIFIER.

also made with the stock extending 8 or 10 inches out of the block.

Steel scrapers for street brooms are made of heavy steel and extend 13/4 inches from the block. They are wide in sizes so as to extend the whole length of the different sized brooms.

Holcomb's wire street brooms are widely used for street cleaning and are also found very handy by garbage disposal companies for sweeping around incinerators; in power plants for sweeping hot coals, ashes, etc., and by contractors for spreading gravel. They are strongly constructed of flat tempered steel wire which is held in hard wood block with a lasting grip. The stock extends out 5 inches and the block is 2 1/2 inches wide, with one staff hole. It is made in three sizes, 12-inch block with 15-inch sweep; 14-inch block and 18-inch sweep, and 16-inch block with 20-inch sweep.

These brooms—the bass fibre one is here illustrated—are made by the J. I. Holcomb Manufacturing Company, Indianapolis, Ind.

interesting exhibit of drawings, note books, report blanks, course outlines, photographs, tools, forms, equipment and concrete work from various schools will be shown. In addition to the work of the week, plenty of entertainment will be provided, including complimentary luncheons and a banquet.

Manual training in concrete has been one of the recent additions to vocational courses in many schools. As a result of the unusual interest which



HOLCOMB STREET BROOM.

this work has created the Portland Cement Association has been deluged during the last few months with requests for information on this subject, and a number of instructors have already expressed a desire to visit Chicago during the summer for the purpose of obtaining direct from the cement industry greater insight into this work.

The general outline of the course follows: (1) Materials for concrete, tests, methods of selection, proportioning. (2) Mixing and depositing concrete. (3) Tools and equipment for manual training concrete work. (4) Forms of simple exercises. (5) Surface treatments. (6) Methods of curing concrete products. (7) Watertight concrete: Methods of repairing leaky cisterns and tanks. (8) Fundamental principles of reinforcing. (9) Concrete highway construction. (10) Practical problems for concrete classes.

The Barber Asphalt Paving Company, Philadelphia, Pa., announces that it has engaged Stanley H. Rose, until recently in charge of the New York office of the Bureau of Foreign and Domestic Commerce of the Department of Commerce, to direct its foreign trade department. Prior to his appointment as commercial agent of the Bureau Mr. Rose had had an extensive business experience in the larger part of Europe, Australia, New Zealand, India and Egypt, and has also held important posts with American and European firms engaged in foreign trade. He is considered an expert in foreign tariffs, trade regulations and shipping. As special agent of the Bureau of Foreign and Domestic Commerce, Mr. Rose has just completed a tour of more than fifty cities of the middle west, south and southwest, acquainting manufacturers with foreign trade opportunities and advising commercial organizations as to the best methods of promoting export trade. The Barber Company's export trade in paving materials, roofing and other asphaltic products will hereafter be in

Mr. Rose's charge, with headquarters in Philadelphia and New York.

Thomas McNeil, Sr., a pioneer boiler manufacturer of Pittsburgh, Pa., and president of the James McNeil & Bro. Co., died May 28, 1916, in his 76th year. He was born in Rutherglen, Scotland, and came to America when eight years old, settling with his parents in Canada until 1860, when he came to New York City. During the Civil War he was employed in the United States Navy Yard at St. Helena Islands, looking after transport vessels for the United States Government. In the year 1865 he came to Pittsburgh and started, with his brother James, in the boiler business, which business was incorporated in 1900 under the present name of James McNeil & Bro. Company. Mr. McNeil was well known to the boiler manufacturers throughout this and other states and his thorough knowledge and long experience in steel plate construction work made him an authority in this line. He was granted several patents in connection with his business and he was one of the first manufacturers who advocated and developed the use of riveted steel pipes for large diameter conduits.

NEWS OF THE SOCIETIES

(Continued from page 809).

insuring community understanding of them, and stimulating community action. He made it clear from his analysis of the survey of Springfield, Ill., a survey which sets a new standard in comprehensiveness and participation by all elements in the community, that the more extensively organized is the co-operation by the people of the city, the more is accomplished through the surveys.

"Sources of Public Support for Social Programs" were discussed by Lawson Purdy, president of the department of taxes and assessments, New York City. He brought to bear his experience in dealing in a practical way with larger problems of public revenue. To these problems he applied social vision and knowledge of human needs toward securing a proportionate distribution of the tax burden. He showed how all cities seek population to increase the value of the land and add to their general prosperity, how this land value and prosperity is dependent upon the industrial productiveness of the people, how such efficiency is increased by conserving health and promoting intelligence and good living conditions. Therefore, such effort for the public welfare is a justifiable charge upon land values. In such states, including most of those of the Middle and Far West, where there are constitutional restrictions as to taxation, he explained how annual assessments of property at its full value would yield more funds at the same rate of taxation, and described the wider application of the principle of special local assessments to secure the money for social improvements.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago—The leading interest has taken the order for 1,800 tons of pipe for Newton, Kans., and also for about 200 tons for Fargo, N. D. The only recent inquiries of importance are for 500 tons at Oskaloosa, Kans., and 210 tons at Morris, Minn. Quotations: 4-inch, \$33.50 to \$34; 6-inch and larger, \$30.50 to \$31; Class A, \$1 extra. Birmingham—The pipe market is inactive, no large lettings being reported. Quotations: 4-inch, \$28; 6-inch and up, \$25; 16-foot lengths, \$1 extra. San Francisco—There are no new municipal contracts, but small purchases for immediate needs are furnishing a satisfactory volume of orders. Quotations: 6-inch and over, \$36; 4-inch, \$39; Class A, \$1 extra. New York—Public lettings have been scarce for some time, nothing of importance being in sight in this immediate territory. Private buying continues fair in volume and prices. Quotations: 6-inch, Class B and heavier, \$30.50; Class A, \$31.50.

Lead.—The easier trend of lead has continued. Quotations: New York, 7.35 cents; St. Louis, 7.20 cents.

The Portland Cement Association, 111 West Washington street, Chicago, Ill., is to conduct, through its extension division, a "Short Course in Concrete for Manual Training and Vocational Teachers." The course is to be given at the Lewis Institute in Chicago, June 26 to July 1.

The course is designed to be practical and it offers a splendid opportunity to study the theory of making concrete and become acquainted with the best recognized practice. It will be given by engineers and teachers of national reputation in the cement industry, assisted by a force of laboratory experts and artisans. A large and

One of the threads which ran through many sections of the conference was an emphasis upon mental defectiveness. It appeared frequently in the meetings on children and correction. Judge Edwin L. Garvin, of New York, devoted his entire address in the general session of the Committee on Corrections to an analysis of the inadequate provision for the feeble-minded and other mental defectives whose delinquency brings them into the criminal or juvenile court. It would be economical for the community, he said, to provide places for their permanent custody.

Under the chairmanship of Superintendent E. R. Johnstone of the Training School at Vineland, N. J., the Committee on Feeble-mindedness and Insanity added fresh impulse to the already strong and widespread conviction that there must be larger community attention to the problem of the feeble-minded.

A paper by Dr. Taliaferro Clark, of the United States Public Health Service, surprised many by giving the rural child a poor comparative standing with the city child. He based his statements largely on studies he had made in Indiana showing that the child in the country is largely denied medical attention by specialists, such as may be had in hospitals and clinics in cities; that country children cannot be protected en masse by health laws as is the case in cities, and that they are more unduly affected by endemic diseases such as malaria, hookworm and pellagra. They are more afflicted than city children in the matters of defective hearing, bad teeth and diseased tonsils, but they are less affected with adenoids and eye troubles.

The present status of the effort to take children out of street trades was covered by Edward N. Clopper, of the National Child Labor Committee; and another part of the children's committee which aroused especial interest was a discussion of the Gary plan. Superintendent Wirt was unable to be present, but Howard W. Nudd, of the Public Education Association, New York City, explained it in its social bearings.

The most enthusiastic applause received by anyone in the series of children's committee meetings was given after the impromptu speech of Prof. George E. Haynes of Fisk University, during the discussion of school supervision beyond school walls. He told of the facts discovered after the great fire in Nashville as to the poverty of most of the negro families, the children left to get breakfast and get to school unhelped, while their mothers went to serve white mothers so that white children could be sent off to school properly fed and mothered.

The meetings of the Committee on the Family and the Community dealt with the daily problems of charity workers. One section meeting was on co-ordination of civic effort in small communities. The subject was introduced by Margaret F. Byington, of New York, who pointed out that since

small communities are able to maintain only a few social agencies, it is a case of amalgamation rather than co-ordination. If a locality is able to support but one worker, she suggested that a public health nurse should be secured. The co-ordinating work of such a nurse was described by Helena R. Stewart, of the Ohio State Board of Health. How a charity organization society may co-ordinate many lines of effort was shown by Adaline A. Bufington, of Lansing, Mich.; and an exceptional instance of civic work in which three communities co-operate was described by Raymond A. Hoyer, director of the Tri-City Social Center at La Salle, Ill.

The two other section meetings dealt with health insurance, discussed by Dr. I. M. Rubinow, executive secretary of the Social Insurance Committee of the American Medical Association, and with co-operative credit. Under the latter topic Arthur H. Ham, of the Russell Sage Foundation, and secretary of the National Association of Remedial Loan Associations, told of efforts to eliminate the loan sharks, and explained the methods of the credit unions based upon the reputation of their wage-earner members for good moral character, honesty and sobriety. Such unions, which have been widely established in European countries, are now gaining a foothold in the United States.

The Committee on Health was under the leadership of Dr. Charles P. Emerson, dean of Indiana University School of Medicine. His clear and stimulating interpretation of the relation between medical and social work was a feature of the committee meetings. One section was given over to venereal diseases in their relation to public and individual health; another dealt with industrial hygiene—the paper being by Dr. E. R. Hayhurst, of the Ohio State Board of Health—and another was devoted to oral hygiene.

At the general session the topic was "Longer and More Effective Living." Dr. Eugene Lyman Fisk, director of hygiene in the Life Extension Institute, New York City, reviewed some of the factors which must be brought into play—commencing with our ancestors and extending through to the understanding of all the laws of life by which it is possible to combat the lethal agencies which bring on old age and death. L. J. Rettger, professor of physiology, Indiana State Normal School, Terre Haute, emphasized the opportunity of the public school to educate for longer and more effective living. School children, he declared, are taught everything else in the world but the law of health.

A discussion of the work of police-women marked the meetings of the Committee on Corrections, of which Katherine B. Davis, of New York, was chairman. Miss Alice Stebbins Wells, of Los Angeles, was the first police-woman appointed, and since then twenty states have made provision for

similar work. Delegates from fourteen of them were present at the conference. Miss Wells is president of the police-women's organization.

The officers for next year's conference, nominated by a pre-conference committee and elected, are: Frederic Almy, of Buffalo, president, and the vice-presidents are Joseph Lee of Boston, Julia C. Lathrop of Washington and Rabbi Emil W. Leipziger of New Orleans. The members of the executive committee are the Rev. Francis H. Gavisk of Indianapolis, who was president this year; Minnie F. Low, Chicago; Katharine B. Davis, New York; John Daniels, Baltimore; Graham Taylor, Chicago; Hastings H. Hart, New York; the Rev. John A. Ryan, Washington; Tracy McGregor, Detroit; Arthur H. Burnett, Toronto, and Gertrude Vaile, Denver. The committee chairmen are: Children, Wilford S. Reynolds, superintendent Illinois Children's Home and Aid Society; Correction, Roscoe Pound, dean of the Harvard Law School; Family and Community, W. Frank Persons, New York Charity Organization Society; Health, Dr. Charles P. Emerson, dean of the University of Indiana Medical School; Public Charities, A. L. Bowen, executive secretary Illinois State Charities Commission; Mental Hygiene, Dr. Owen Copp, Philadelphia; Community Programs, Robert A. Woods, South End House, Boston; Social Insurance, Max Senior, Cincinnati; Rural Social Problems, John H. Gillette, professor of sociology, University of North Dakota. William T. Cross was re-elected secretary-treasurer.

Oklahoma State Firemen's Association.

At the annual convention of the Oklahoma State Firemen's Association held at Cushing, May 23-26, the following officers were elected: W. F. Davis, Pawhuska, president; George Gaddis, Chickasha, first vice president; J. R. Haley, Fairview, second vice president; Alvin Gelfhaar, Cushing, third vice president; Charles Stemp, Anadarko, secretary and treasurer, and Otto Lorence, sergeant-at-arms; Ross Brooks, Oklahoma City, Mr. Brown, Shawnee, and Fred Sampson, Duncan, legislative committee.

International Association of Railway Special Agents and Police.

The International Association of Railway Special Agents and Police held the twentieth annual convention at the Grunewald Hotel, New Orleans, La., May 22-25. Omaha was selected as the place for the next meeting and the following officers were elected: T. T. Keliher, chief special agent of the Illinois Central of Chicago, president; M. Morweiser, inspector, Rock Island, of Chicago, first vice president; W. J. Stark, assistant chief special agent of the Michigan Central, Chicago, second vice president; W. C. Pannell, inspector Southern Railway, and special agent of the Chesapeake Steamship Company, of Baltimore, Md., secretary-treasurer.

ADVANCE CONTRACT NEWS

ADVANCE INFORMATION BIDS ASKED FOR

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

CONTRACTS AWARDED ITEMIZED PRICES

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS.				
Fla., Sanford.....	June 10..	130,000 sq. yds. brick pav't, bridges and curbs.....	G. R. Ramsey, Engineer, Orlando, Fla.	
Kansas, Wichita.....	June 10..	Paving several streets, cost \$25,000.....	B. C. Wells, City Engr.	
O., Zanesville.....	June 10..	2,000 yds. brick pavement, cost \$4,200.....	C. R. Spencer, City Engr.	
Ind., Richmond.....	11 a.m., June 10..	24,000 gals. of road oil.....	L. S. Bowman, Co. Auditor	
Ind., Danville.....	10.30 a.m., June 10..	13,350 ft. road construction.....	C. M. Havens, Co. Auditor.	
S. D., Lemmon.....	June 10..	Grading and road construction.....	Township Supervisors.	
Pa., Mt. Penn.....	June 10..	Paving with concrete.....	W. H. Dechant & Sons, Baer Bldg., Reading, Pa.	
Pa., Robesonia.....	June 10..	Paving with bituminous macadam.....	W. H. Dechant & Sons, Baer Bldg., Reading, Pa.	
O., Marion.....	10 a.m., June 10..	8,800 ft. waterbound macadam.....	V. Perle Garfield Clk. Co. Comr.	
Ga., Gainesville.....	June 10..	Laying 20,000 yds. brick, asph. coner. or other material.....	R. E. Andoe, Clerk of Council.	
Tex., Athens.....	June 10..	40 miles of sand-clay road.....	A. B. Axtell, Engineer.	
la., Estherville.....	June 11..	Grading 21 miles of road.....	C. P. Smith, Co. Engineer.	
N. D., Oakes.....	2 p.m., June 12..	Grading several roads.....	W. W. Denning, Clk Twp. Bd.	
Va., Rustburg.....	June 12..	24 miles bituminous macadam and 9 miles waterbound macadam road.....	G. P. Coleman, St. Hwy. Comr. Richmond, Va.	
W. Va., Kingwood ...	1 p.m., June 12..	Grading and surfacing 50 miles of road.....	E. C. Everly, Clk. Co. Court.	
N. J., Camden.....	11 a.m., June 12..	Furnishing $\frac{3}{4}$ and $1\frac{1}{2}$ -inch broken stone.....	F. W. George, Clerk.	
N. J., Millburn.....	8 p.m., June 12..	Paving several streets.....	M. R. Silance, Township Clk.	
Wash., Olympia.....	2 p.m., June 12..	Surfacing with gravel or shale 6.8 miles highway.....	Jas. Allen, Sec. St. Hwy. Bd.	
Ind., South Bend.....	11 a.m., June 12..	Road construction.....	A. F. Wolf, County Auditor.	
Mo., St. Charles.....	June 12..	5,800 ft. telford road.....	Alfred Riske, Co. Hwy. Engr.	
La., New Orleans.....	noon, June 12..	65 miles gravel road, 12 miles earth road.....	W. E. Atkinson, State Highway Engineer.	
O., Cuyahoga Falls.....	noon, June 12..	Grading, draining, paving and curbing.....	W. K. Taylor, Mayor.	
N. J., P'th Amboy.....	2:30 p.m., June 12..	34,000 sq. yds. asphalt block on concrete foundation.....	Alvin D. Fox, Co. Engr.	
N. Y., Malone.....	7.30 p.m., June 12..	Paving with brick 0.21 mile.....	S. A. Howard, Court House.	
Neb., Central City.....	June 12..	Cement sidewalks and crossings.....	W. W. Wolcott, City Clerk.	
Ind., Evansville.....	10 a.m., June 12..	Constructing stone roads.....	C. P. Beard, County Auditor.	
Ind., Brazil.....	10.30 a.m., June 12..	Two stone and gravel roads.....	W. O. Graeser, County Auditor.	
Wash., Colfax.....	1 p.m., June 12..	Grading, draining and bridging 12 miles of road.....	A. R. Metz, County Auditor.	
O., Upper Sandusky.....	June 12..	Grading, curbing and paving 4 streets.....	C. U. Read, Village Clerk.	
Ill., Freeport.....	June 12..	Brick paving, curbing, etc.....	Bd. of Local Improvements	
Wash., North Yakima.....	June 12..	Paving 4 streets.....	R. V. Hopper, City Clerk	
Ind., Winamac.....	June 12..	32,350 yds. of pavement and 19,000 ft. curb and gutter.....	Clarence Barnett, City Clerk	
O., Cincinnati.....	June 12..	Oiling macadam streets.....	P. S. Johnson, Sec. Dir. P. S.	
N. J., Montclair.....	June 12..	Paving with asphaltic concrete.....	Harry Trippett, Town Clerk	
Ind., Lebanon.....	June 12..	Laying four blocks of concrete sidewalks.....	Walter Whitecotton, City Engineer.	
Neb., Omaha.....	June 12..	Improving streets in several districts.....	J. A. Bruce, City Engineer.	
W. Va., Grafton.....	June 12..	Laying 1,300 sq. yds. brick pavement.....	C. W. Chaddock, St. Comr.	
N. D., Edmore.....	10 a.m., June 12..	Improving and constructing roads.....	Township Supervisors.	
Minn., St. Paul.....	10.30 a.m., June 12..	Grading several streets.....	August Hohenstein, Pur. Agt.	
N. J., Elizabeth.....	2:30 p.m., June 12..	Repairing Amesite roads.....	J. L. Bauer, Co. Engineer.	
N. D., Williston.....	4 p.m., June 12..	Constructing township road.....	C. E. Ekeberg, Twp. Clerk.	
N. J., Elizabeth.....	3 p.m., June 13..	30,000 sq. yds. bituminous concrete.....	J. L. Bauer, Co. Engineer.	
N. Y., Norwich.....	June 13..	Paving streets.....	C. E. Harris, City Engineer.	
Minn., Albert Lea.....	2 p.m., June 13..	Grading and surfacing with gravel.....	Fred Tavis, Co. Auditor.	
N. J., Trenton.....	June 13..	52,100 sq. yds. resurfacing.....	T. Tobish, Co. Engr.	
Minn., Duluth.....	11 a.m., June 13..	Improving streets.....	W. H. Borgen, City Clerk	
Utah, Salt Lake City.....	10 a.m., June 13..	Paving with sheet asphalt.....	S. Q. Cannon, City Engineer.	
Ind., South Bend.....	10 a.m., June 13..	Paving several streets; graveling.....	Veronica Sweeney, Clerk, Bd. Pub. Wks.	
Mo., St. Louis.....	Noon, June 13..	Improvin 9 streets.....	E. R. Kinsey, Pres. Bd. Pub. Serv.	
N. Y., New York.....	11 a.m., June 13..	Two concrete and brick buildings and 820 yds. of brick pavements.....	Board of Water Supply.	
Pa., Harrisburg.....	10 a.m., June 13..	Constructing reinforced concrete, brick and bituminous pavements.....	J. W. Hunter, First Deputy State Highway Comr.	
N. C., Dunn.....	5 p.m., June 13..	17,000 sq. yds. brick, asph., bitulthic or oth. w't, 3,000 ft. coner. curb and gut. and 1,000 sq. yds. of sidewalk.....	G. C. White, Engineer, Durham, N. C.	
Wis., Janesville.....	2 p.m., June 13..	14,458 sq. yds. asphalt macadam and 3,000 cu. yds. excavation.....	City Clerk.	
O., Columbus.....	noon, June 13..	200,000 old style paving blocks, 300,000 new style, 500 tons pitch, 2,000 yds. sand, 8,000 tons macadam stone, 5,000 tons of dust or screenings, 1,000 yds. crushed slag and 20,000 gals. bituminous material.....	G. A. Borden, Pres. Board of Purchase.	
N. J., Paterson.....	2 p.m., June 14..	Paving with asphalt and bituminous concrete.....	County Engineer.	
N. Y., New York.....	2 p.m., June 14..	Regulating and repaving with sheet asphalt.....	Comr. of Public Works.	
N. Y., New York.....	10:30 a.m., June 14..	Paving with sheet asphalt and bituminous concrete.....	Douglas Mathewson, President Boro. Bronx.	
Mo., St. Louis.....	June 14..	Ten contracts for street paving.....	W. T. Findley, Secy. Bd. P. S.	
O., Eaton.....	June 14..	Laying 40,000 sq. yds. paving.....	A. L. Reid, Village Engineer.	
Minn., Anoka.....	2 p.m., June 14..	Road construction.....	A. A. Caswell, Co. Aud.	
N. J., Atlantic City.....	11 a.m., June 14..	10-ton steam roller, 2,000 ft. concrete gutter.....	A. H. Nelson, Co. Engineer.	
Fla., Miami.....	June 15..	60,000 sq. yds. pavement, curbs, gutter, etc.....	W. B. Moore, City Clerk.	
Md., Hagerstown.....	June 15..	3.56 miles of road.....	G. A. Wolfinger, Clerk, Co. Commissioners.	

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Mo.	Carthage	June 15	12,000 sq. yds. asphalt macadam	F. B. Newton, City Engr.
O.	Greenfield	June 15	Paving with brick and macadam, cost \$25,000	E. M. Connor, City Clerk.
O.	Zanesville	June 15	13,000 yds. brick pavement and 1,300 yds. concrete pavement, curbs and gutters	C. R. Spencer, City Engr.
Cal.	Fowler	June 15	13,000 sq. yds. pavement, cost \$10,000	C. P. Jensen, City Engr.
Ind.	Logansport	10 a.m., June 15	Improving streets	Bd. Public Works.
Ariz.	Tucson	10 a.m., June 15	244,000 sq. yds. macadam, 100,000 cu. yds. excavation, etc.	B. L. Hitch, Clk. Bd. Supvs.
Minn.	Thief River Falls	2 p.m., June 15	Three-quarter mile gravel road	T. P. Anderson, County Aud.
Md.	Hagerstown	June 15	Constructing 3 1/2 miles state aid road	County Commissioners
Fla.	Jacksonville	June 15	Furnishing 1,000 vds. of oyster shell	Board of County Comrs.
O.	Canton	June 15	Constructing sidewalks	Zetler Building Co., Daily News Bldg.
Minn.	Mankato	2 p.m., June 15	Constructing culverts, grading and turnpiking	C. L. Kennedy, Co. Aud.
Wis.	Stevens Pt.	7:30 p.m., June 15	Paving 10 blocks	W. L. Bronson, Clerk, Board Public Works.
Sask.	Saskatoon	noon, June 15	Paving bridge with wood blocks	C. J. Yorath, City Comr.
Pa.	Philadelphia	June 15	Paving with asphalt, brick, granite, wood block and macadam, grading, etc.; cost, \$373,200	W. H. Connell, Chief Bureau Highways.
O.	Columbus	2 p.m., June 15	Constructing macadam or bituminous macadam roads	Clinton Cowen, State Hwy. Commissioner.
Tex.	Galveston	5 p.m., June 15	29,825 sq. yds. pav't, 5,075 ft. of curbs, bulkheads, etc.	A. T. Dickey, City Engineer.
O.	Celina	1 p.m., June 16	Grading and graveling road	M. L. Hinton, Engineer, Court House.
Wash.	Tacoma	11 a.m., June 16	First class pavement on 3.7 miles of road	T. N. Morris, County Auditor.
O.	Van Wert	June 16	Paving several streets with macadam, tarvia, brick, asphalt or concrete	W. T. Mitchener, Dir. Pub. S.
Pa.	Harrisburg	June 16	Constructing state highways	State Highway Dept.
Ind.	Franklin	10 a.m., June 16	Constructing gravel road	J. C. Gregg, Co. Aud.
N. Y.	Kolgoeville	8 p.m., June 17	Improving two streets	W. H. Bacon, Village Clerk.
Ind.	Lafayette	10 a.m., June 17	Grading, curbing and paving roads	G. W. Baxter, County Aud.
N. Y.	New York	11 a.m., June 17	Wood block paving in Navy Yard	Bureau of Yards & Docks, Washington, D. C.
N. Y.	Monticello	June 17	Paving with bituminous macadam	Chas. Ebinger, Vil. Clerk
Wis.	Oshkosh	10 a.m., June 17	Macadamizing and constructing conc. curb & gutter	Wm. F. Porath, Bd. Pub. Wks.
Ind.	Kokomo	June 19	Paving with brick; estimated cost, \$20,000	W. F. Mann, City Engineer.
O.	Cuvahoga Falls	June 19	32,000 sq. yds. brick pavement	E. D. Barstow, Village Engr.
La.	Traer	June 19	15,800 sq. yds. of paving	T. F. Stoakes, Town Clerk
Wash.	Seattle	June 19	Grading and graveling 6.7 miles of road	Byron Phelps, Clk. Co. Comrs.
Wash.	Montesano	June 19	10,000 yds. concrete pavement and 5,000 yds. of grading	Geo. D. Robertson, Co. Engr.
Wash.	Everett	June 19	Constructing several roads	Mae Weatherbee, Co. Aud.
O.	Eastview	noon, June 19	Paving, curbing and improving streets	F. A. Pease Eng'g Co., Marshall Bldg., Cleveland, O.
N. D.	Minot	June 19	25,000 sq. yds. pavement, cost \$85,000	E. J. Thomas, City Engr.
Pa.	Cresson	8 p.m., June 19	18,200 sq. yds. brick or concrete pavement and 10,700 ft. curbing	D. W. Dillman, Engr., Altoona Trust Bldg., Altoona, Pa.
N. J.	New B'sw'k.	2:30 p.m., June 19	Repairing with bituminous concrete	A. B. Fox, Co. Engr., Perth Amboy, N. J.
Ala.	Thomasville	June 20	Constructing sand-clay road (Jackson Highway)	A. L. Smith, Engineer.
Wis.	Rockville Center	June 20	Constructing concrete roads	Village Clerk
Ala.	Vernon	June 21	Drainage and graveling highway	County Commissioners.
O.	Utica	June 21	Grading and paving several streets with brick	B. J. Smith, City Clerk.
Pa.	Sharpsville	noon, June 21	6,865 yds. paving (material not decided)	W. A. Graber, Boro. Sec'y.
Ark.	Hot Springs	3 p.m., June 21	Driveway, grading and curbs at post office	Custodian of Post Office.
Ala.	Vernon	June 21	Grading and graveling 11 miles	County Comrs.
Miss.	Charleston	June 21	Constructing 1 1/2 miles road	County Supervisors.
Fla.	Sebring	June 21	48,000 sq. yds. of pavement; \$56,000 available	Jaudon Engineering Co., Savannah, Ga., & Bartow, Fla.
Ind.	Frankfort	2 p.m., June 23	19,000 sq. yds. brick, concrete, bit., macadam or asphaltic concrete; 60,000 sq. ft. cement sidewalks, 11,000 ft. cement curb, grading, circular curb, etc.	R. H. Boynton, City Engineer.
O.	Cincinnati	noon, June 23	Improving, repairing and resurfacing roads	Albert Reinhardt, Co. Clerk.
Ind.	Indianapolis	10 a.m., June 23	Reconstructing two roads	L. K. Fesler, Co. Auditor.
Ind.	Muncie	10 a.m., June 24	Grading, graveling or macadamizing two roads	F. M. Williams, Co. Auditor.
Ind.	Indianapolis	10 a.m., June 25	Reconstructing two roads	L. K. Fesler, Co. Auditor.
Pa.	Washington	June 26	Improving 8.3 miles of road	T. J. Underwood, Co. Control.
La.	Cedar Rapids	June 26	10,000 yds. brick and 24,000 yds. asphaltic concrete pave.	City Clerk
N. Y.	Albany	1 p.m., June 26	Constr. and repairing highways and fur. broken stone	Edwin Duffey, St. Hwy. Comr.
Utah	Salt Lake City	June 27	Concrete and asphalt paving	S. Q. Cannon, City Engr.
Tenn.	Jackson	June 27	54,000 sq. yds. brick pavement	Hu. M. Harris, Comr. of Sts.
W. Va.	New Martinsville	June 29	Constructing 15 miles of road	J. R. Wilson, Engr., Mannington, W. Va.
La.	Britt	June 29	26,600 yds. of paving and 15,500 ft. of curbing	T. S. DeLav. Engr., Creston, Ia.
Ala.	Centerville	June 29	Grading and graveling road	County Commissioners.
Wis.	Burlington	2 p.m., June 30	7,600 yds. of macadam, 8,300 yds. asphaltic concrete, 7,800 yds. of grading and 4,500 ft. cement curb	City Clerk.
Wis.	Burlington	2 p.m., June 30	Grading, curbing and paving with macadam	Board of Public Works.
Ind.	Rushville	June 30	7 1/2 miles macadam or gravel roads	A. R. Holden, Co. Auditor
Ala.	Bay Minette	July 1	Constructing county highways	J. M. Garrett, Co. Engr.
Ala.	Mobile	July 1	Constructing Delta highway	County Rd. Comrs.
O.	Maumee	July 1	20,000 sq. yds. of paving	T. N. Dowling, City Clerk
Miss.	Greenwood	noon, July 3	Surfacing 100 to 140 miles roads	A. R. Bew. Clerk, Co. Supvs.
La.	Terrebonne	noon, July 5	Constructing 11.7 miles sand-clay-gravel roads	T. B. Smith, Eng., Houma, La.
Ind.	Mt. Vernon	2 p.m., July 5	1,800 ft. stone road	J. R. Haines, Co. Auditor.
Miss.	Greenwood	July 10	100 to 140 miles hard surface road; \$600,000 available	County Supervisors.
Tex.	Caldwell	July 10	Sand clay roads; \$20,000 available	C. H. Maljowsky, Engineer.
Ill.	Springfield	Aug. 11	Curbing and paving with brick; cost, \$75,000	W. D. Seeley, City Engineer.

SEWERAGE.

N. J.	Montclair	June 12	Constructing storm sewers	E. S. Closson, City Engr.
N. Y.	New York	2 p.m., June 12	Altering and improving sewers and basins	Comr. of Public Works.
Cal.	Redondo Beach	June 12	10 carloads 4 to 18-in. sewer pipe	C. C. Mangold, City Clerk
Ia.	Grinnell	June 12	1,600 ft. 8 and 12-in. vitrified sewer	Iowa Engineering Co., Clinton, Ia.
Ill.	Elmhurst	7:30 p.m., June 12	670 ft. 6 to 12-in. sewer, manholes and catch basins	H. L. Emerson, Engr., Chamber of Com. Bldg., Chicago.
Ill.	Freeport	2 p.m., June 12	Constructing storm sewers	C. S. Hepner, City Engineer.
O.	Cincinnati	noon, June 12	Constructing relief sewers	C. F. Hornberger, Dir. Pub. Ser.
Minn.	St. Paul	10:30 a.m., June 12	Constructing several sewers	August Hohenstein, Pur. Agt.
Ia.	Dyersville	6 p.m., June 12	1,600 ft. 6 and 8-in. sewers and 4 manholes	W. C. Loosbrock, Town Clerk.
Ia.	Clinton	8 p.m., June 13	Constructing sewers	J. G. Thorne, City Engineer.
N. J.	Newark	June 13	Branch of intercepting sewer in Paterson	Passaic Valley Sew. Comm.
N. J.	Point Pleasant	June 13	Extensions to sewer system	W. T. Newberry, Boro. Clerk
Ind.	South Bend	10 a.m., June 13	Constructing pipe sewers and sewer connections	Veronica Sweeney, Clerk Bd. Pub. Wks.
Ia.	Clinton	8 p.m., June 13	Sewer	City Clerk.
Neb.	Lexington	8 p.m., June 13	Extending lateral sewer	H. L. Temple, City Clerk.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES
Okla.	Afton	8 p.m., June 14	Main sewers, including 2,990 ft. 15-in. pipe, 2,510 ft. 12-in. pipe, 3,576 ft. 10-in. pipe, 1 flush tank and sewage purification plant; laterals sewers, including 5,115 ft. 10-in., 11,130 ft. 8-in.	City Trustees.
O.	Urbana	noon, June 14	Constructing several sewers	City Engineer.
N. Y.	New York	10:30 a.m., June 14	1,250 ft. sewers, excavation, manholes, etc.	Douglas Mathewson, Pres. Boro. Bronx.
N. Y.	Brooklyn	11 a.m., June 14	Constructing sewers, 6 to 36-in.	L. H. Pounds, Boro. Pres.
la.	Cherokee	June 15	Constructing storm sewer.	Wm. Shadlow, City Clerk.
Neb.	Pawnee City	8 p.m., June 15	Sanitary sewer system; cost, \$39,568.	D. E. Wherry, Mayor.
Tex.	Galveston	5 p.m., June 15	1,000 ft. 12-in. sewer, 3,500 ft. 15-in. sewer, drains, etc.	A. T. Dickey, City Engineer.
Mich.	Escanaba	5 p.m., June 15	Constructing sewage disposal plant, cost \$30,000.	W. J. Hodson, City Engineer.
Mont.	Harlowtown	8 p.m., June 15	Sewer system and disposal plant	S. K. Campbell, Town Clk.
Ky.	Lexington	June 15	Constructing main outfall sewer	J. White Guyn, City Engr.
Va.	Richmond	June 15	5,200 ft. concrete sewer	C. E. Bolling, City Engr.
Wash.	Oaksdale	June 15	2 1/2 miles sewers, tank and filter beds, cost \$18,000.	Sawyer Bros., Engrs., Lin-delle Block, Spokane, Wash.
N. J.	Lodi	June 15	Constructing sewer system and disposal plant	Bowe and Wessels, Engineers, Rutherford, N. J.
Wash.	Oakesdale	June 15	2 1/2 miles sewer and disposal plant; cost \$18,000.	City Clerk.
O.	Zanesville	June 15	500 feet 5 to 15-inch sewer.	C. R. Spencer, City Engineer.
Arizona	Oatman	June 15	Water and sewer systems, estimated cost \$250,000.	C. L. Mayhew, Sec. Mohave-Oatman Water Co.
O.	Xenia	June 15	Constructing storm sewers, cost \$35,000.	J. P. Shumaker, City Engineer.
N. D.	Devils Lake	7:30 p.m., June 15	Constructing sewage disposal plant.	M. J. Cowley, City Auditor
N. D.	Mohall	8:30 p.m., June 15	Constructing sewer system.	T. Syverson, City Auditor.
Fla.	Miami	June 15	8,900 ft. concr. and vit. sewer, 12 to 24-in.	W. B. Moore, City Clerk.
Minn.	Blue Earth	June 15	Storm sewer, requiring 20,000 ft. 12 to 48-in. pipe.	City Clerk.
Minn.	Morris	2 p.m., June 16	Constructing tile drainage ditch, 6 to 24-in. tile.	C. R. Wolltham, Co. Aud.
N. J.	Camden	8 p.m., June 19	Constr. sewers in several sts.; two 5-yd. ash wagons.	A. E. Sparks, Chairman St. & Highway Committee.
Minn.	Spooner	8 p.m., June 19	Constructing sewer system and disposal plant	Duluth Engineering Co., Pal-ladio Bldg., Duluth.
la.	Oskaloosa	June 19	Sewage disposal plant, to cost \$5,000.	H. C. Hawkins, City Engineer.
Mont.	Columbus	June 19	4,500 ft. 8 to 12-in. sewer and disposal plant.	G. N. Cardozo, City Engr.
N. J.	Little Falls	June 19	Constructing sewers and disposal plant.	H. J. Harder, Engr., Market St., Paterson
Ind.	Michigan City	June 20	Constructing sewers in 11 streets.	City Clerk
Miss.	McComb City	June 20	Constructing sewer system, \$90,000 available.	City Clerk.
Wis.	Milwaukee	June 22	Extending sewer system	Sewerage Commission
Sask.	Saskatoon	June 22	Constructing sewage lift chamber and furnishing sewage lift pumps at the Park Man.	Murnhy & Underwood, Engrs.
Ind.	Frankfort	2 p.m., June 23	1,520 ft. tile drains, manholes, etc.	R. H. Boynton, City Engineer.
Ariz.	Tucson	June 26	Constructing 17 miles 8 to 20-in. sewers and 3 miles 30-in. outfall sewers	C. K. Clark, City Manager
N. Y.	Rochester	noon, June 27	Constructing sewer	W. H. Wotherspoon, St. Supt. P. W., Albany, N. Y.
Ind.	Frankfort	2 p.m., June 30	Constr. tile and c. i. sewers, 6 to 18-in.; cost, \$25,220.	R. H. Boynton, City Engineer.
N. Y.	Collingswood	June 1	Constructing storm sewers	Remington & Vosbury, Engi-neers, Camden, N. J.
O.	Portsmouth	July 1	Sanitary sewer system; cost, \$41,476.	Ralph Calvert, Dir. Public Service.
Minn.	Benson	July 1	48 miles drainage ditch; 250 miles 6 to 30-in. tile.	F. B. Gardner, Engineer.
Ill.	Salem	July 15	Sewer system and disposal plant, cost \$50,000.	City Clerk.

WATER SUPPLY

Ind.	LaPorte	2 p.m., June 12	Reinforced conc. reservoir, involving 900 cu. yds. of conc. and 200,000 lbs. of steel reinforcing bars.	L. Drew Goddard, City Engr.
Minn.	St. Paul	10:30 a.m., June 12	Furnishing two rotary screens.	August Hohenstein, Pur. Agt.
Pa.	Philadelphia	noon, June 12	Electrical equipment for pumping station	Room 216, City Hall.
Pa.	Pittsburgh	June 12	Water meters and parts for 1916, \$100,000 available.	City Controller
B. C.	Victoria	4 p.m., June 12	3,300 ft. 12-in. c. i. pipe, 600 ft. 8-in., 12-in. check valves and 7 hydrants.	C. H. Rust, City Engineer.
Ill.	Cicero	8 p.m., June 12	Constructing water service and house drain pipe, tile sewers and water supply pipes.	Chas. Stoffel, Town Clerk.
Wis.	Sheboygan Falls	2 p.m., June 12	Drilling deep well, constructing steel tank and pumping station and laying 4 miles of pipe	City Clerk.
Minn.	Keewatin	8 p.m., July 12	2,400 ft. 1 1/4-in. iron conduit pipes and fittings; 2,400 ft. cable, etc.	C. W. Extrum, Village Clerk.
la.	Atlanta	10 a.m., June 12	Tubular boiler complete.	C. Kringel, Co. Aud.
Ill.	Springfield	10 a.m., June 13	Installing steam and water line at State School	Board of Administration.
Ind.	South Bend	10 a.m., June 13	Water and sewer connections.	Veronica Sweeney, Clerk Bd. Pub. Wks.
Va.	Richmond	noon, June 15	Aluminum sulphate	E. E. Davis, Supt. of W. W.
Tex.	Port Arthur	2 p.m., June 15	Equipment for pumping plant	J. F. Coleman, Engineer, Hi-bernian Bldg., New Orleans La.
Arizona	Oatman	June 15	Installing water and sewer systems, cost \$250,000.	C. L. Mayhew, Sec. Mohave-Oatman Water Company.
Mont.	Harlowtown	8 p.m., June 15	Constructing water works system	S. K. Campbell, Town Clerk.
Ind.	Jasper	June 15	Installing pressure filtration plant.	S. A. Berger, City Clerk
Neb.	Staplehurst	June 15	Water works system, cost \$12,990.	Grant & Fulton, Engrs., Lin-coln, Neb.
Neb.	Pawnee City	8 p.m., June 15	Extending water system; cost, \$9,500.	D. E. Wherry, Mayor.
Neb.	Seward	10 a.m., June 15	Constructing water mains and system.	Grant & Fulton, Engineers, Lincoln, Neb.
O.	Middletown	noon, June 16	120 tons 6 and 10-in. c. i. pipe and 3 tons specials.	City Commissioners.
D. C.	Washington	June 16	Pipes, fittings, valves, etc.	General Purchasing Officer, Panama Canal
N. J.	Trenton	2 p.m., June 16	Addition to water system at State Hospital; extending fire services	Bd. of Managers, N. J. State Hospital.
Nev.	Winnemucca	June 17	21,000 ft. 4 to 8-in. clay pipe, 73,000 ft. 8-in. and 28,000 ft. 12-in. wood or steel pipe with valves and gates for water works system	J. W. Davey, Clk. Co. Comrs.
La.	New Orleans	noon, July 18	Riveted steel pipe for drainage system.	G. G. Earl, Supt. W. & Sew-erage Board.
Ill.	Carrollton	noon, June 20	250-gallon kerosene driven triplex pump	G. W. Whiteside, Engineer.
Ind.	South Bend	10 a.m., June 20	Constructing water connections.	V. C. Sweeney, Clk. Bd. P. W.
D. C.	Washington	2 p.m., June 23	7,000 5-8 inch water meters	District Commissioners.
D. C.	Washington	10:30 a.m., June 26	Wrought iron and steel pipe and fittings and soil pipe.	Pur. Officer, Panama Canal.
N. Y.	Troy	July 1	Concrete gate house and 24x16-in. reducer.	A. E. Roche, City Engineer.

MISCELLANEOUS.

D. C.	Washington	10 a.m., June 13	Furnishing cement to several navy yards and to Naval Academy and Pensacola Aeronautic Station.	Samuel McGowan, Paymaster-General, U. S. N.
Ind.	Muncie	1 p.m., June 13	Cleaning and repairing ditches.	Goly Snider, Twp. Trustee.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Ore., Hermiston.....	June 15..	Canal work, including 168,000 cu. yds. excavation.....	U. S. Reclamation Service.	
Ill., Belleville.....	June 15..	Improving creek, cost \$79,600.....	W. C. Wolf, City Engineer.	
Utah, Provo.....	June 15..	Constructing canal.....	U. S. Reclamation Service.	
Mass., Revere.....	noon, June 15..	Concrete paving mixer.....	C. G. Richmond, Supt. Public Works.	
Minn., Thief River F'ls.....	3 p.m., June 15..	Constructing ditch; cost, \$1,783.....	G. P. Anderson, Co. Auditor.	
Ind., Winamac.....	June 16..	Constructing drainage ditch and branches.....	C. E. Paul, Construction Comr.	
Ind., Indianapolis.....	10 a.m., June 16..	Furnishing automobile.....	L. K. Fesler, Co. Aud.	
Conn., Bridgeport.....	Noon, June 19..	Constructing 3,900 ft. sea wall	A. H. Terry, City Engr.	
La., New Orleans.....	11 a.m., June 20..	Furnishing stone.....	U. S. Engineer Office.	
Mont., Malta.....	2 p.m., June 22..	Canal work, including 124,000 cu. yds. excavation.....	U. S. Reclamation Service.	
N. Y., Auburn.....	June 23..	Draining waste land	W. Williams, Secy. Pond Hundred Drainage Association, Fair Haven, N. Y.	
Tex., Balmorhea	June 24..	270,000 yds. excavation and embankment, 4,000 cu. yds. concrete and 22,000 yds. dry paving.....	W. W. Stewart, Secy. Irrigation District.	
Texas, Balmorhea....	2 p.m., June 24..	Constructing of diverging dam and canal, two earth storage dams with outlet work and canals.....	V. L. Sullivan, Ch. Engineer, Reeves Co. Irrig. Dist. No. 1.	
Va., Clintwood.....	June 26..	Two steel bridges.....	W. E. French, Co. Engineer.	
Ind., Indianapolis....	10 a.m., June 30..	Fire protection for Court House.....	L. K. Fesler, Co. Aud.	
Siam, Bangkok.....	Aug. 1..	Furnishing suction or hydraulic dredge.....	Director General, Royal Irrigation Dept.	

STREETS AND ROADS

Mena, Ark.—Plans and specifications and estimates of cost for building 69 miles of proposed highway have been completed. H. R. Carter is state highway engineer.

Tucson, Ariz.—Plans are being considered for paving several streets at cost of about \$12,000.

Los Angeles, Cal.—Engineer instructed to prepare ordinance for paving of Vermont Ave. from Melrose Ave. to Temple St.

Los Angeles, Cal.—Ordinances have been passed for improvement of several streets by paving and constructing sewers.

Sacramento, Cal.—Clark & Henery Construction Co. has submitted a bid for 9½ cts. a sq. ft. and 45 cts. a lin. ft. for curbs and gutters on 33d St. Ransome-Crummey Co. bid 9½ cts. and McGillivray Construction Co. bid 10.4 cts.

Sacramento, Cal.—For the survey of road between Pescadero and the Santa Cruz Redwood National Forest, Legislature has appropriated the sum of \$10,000.

Sacramento, Cal.—City Commission has passed its resolution of intention providing for the improvement of several streets.

Santa Ana, Cal.—Orange Ave. will be paved with crushed rock and oil. Council has ordered Fifth St. to be resurfaced and has granted petition for improving three blocks of Fruit St.

San Diego, Cal.—City contemplates repairs and improvements on several streets. J. M. Loop is city clerk.

San Francisco, Cal.—Bonds amounting to \$15,000,000 have been issued for the completion of the State Highway system.

San Jose, Cal.—Mayor has approved ordinance calling for paving on San Fernando St. with asphaltic concrete. Roy E. Walter is city clerk.

South Stockton, Cal.—City has the paving of streets with asphalt under consideration.

Georgetown, Del.—Citizens voted at special election to pave streets with cement and build road to connect with the duPont Boulevard, half a mile from town. Bonds will be issued and the work will begin shortly.

De Land, Fla.—Nearly \$100,000 is to be spent on the improvement of city streets and parks and to provide drainage basins for storm water.

Springfield, Ill.—The paving with brick of Miller St. at an estimated cost of \$16,586.12 is under consideration.

Springfield, Ill.—Council considering ordinance providing for laying of brick pavement in Peoria Rd. at estimated cost of \$26,586.92. Paving ordinance will be introduced providing for brick pavement in Miller St. from Seventh to Thirteenth Sts. Estimates on improvement prepared by City Engineer Seeley, place probable cost at \$16,856.12.

Waukegan, Ill.—Proposition is being discussed for paving south side of Tenth St. with brick.

Kokomo, Ind.—An estimate of \$23,999.40 for the improvement of East Superior St. has been submitted.

Mishawaka, Ind.—Street Car Co. will

be notified to repair pavement between its tracks on Lincoln Highway.

Plymouth, Ind.—County treasurer has sold \$112,000 road improvement bonds, four and one-half per cent, 10 years, at par and accrued interest. Bonds were sold in six series and sold as follows: \$12,200 series to Fletcher American bank for \$181 premium; \$15,570 series to Marshall County Trust & Savings Co. for \$236; \$15,350 series to Marshall County Trust & Savings Co. for \$255; \$33,700 series to Miller & Co. for \$403; \$19,800 series to Fletcher American bank, \$295; \$15,900 series to Marshall County Trust & Savings Co., \$241. Total premium, \$1,591.

Portland, Ind.—A motion has been made and carried to improve Depot St. by paving with brick. Necessary plans, specifications and resolutions are to be made immediately.

Richmond, Ind.—City Engineer Bolling has instructions to advertise for bids for laying granolithic sidewalk on unpaved portions of Robinson St. between Broad and Cary.

South Bend, Ind.—The construction of a new highway between Osceola and Elkhart is under consideration.

Jennings, Ia.—The election upon a bond issue for \$500,000 carried and will be used for new highways.

Waterloo, Ia.—The advisability of repaving several streets in the business district is under consideration. William Galloway Co. has agreed to donate \$1,500 to assist in paying for some of the paving.

Waterloo, Ia.—Several streets have been added to the list to be paved.

Waterloo, Ia.—City may purchase an asphalt repairing machine. City Engineer is investigating the cost.

Frankfort, Ky.—Ballard county has let contract for 54.8 miles of improved gravel road at approximately \$190,000 and contracts have been submitted to State Road Commissioner R. C. Terrell. Ballard voted \$300,000 in bonds.

Hopkinsville, Ky.—Christian county's \$400,000 4½ per cent. road bonds, were sold to J. C. Mayer & Co. and Rudolph Kleyholte Co., both of Cincinnati on their joint bid of \$101.63 or premium on issue of \$4,120.50.

Lexington, Ky.—City council at recent meeting accepted proposition of residents of Holt Ave., Howard Ave. and Clay St., to resurface and macadamize those streets at cost of citizens. In lieu of brick or asphalt streets, and as money on streets has been made up, work will probably be begun in a few days. Work will be under supervision of citizens of streets mentioned.

Lexington, Ky.—Work of paving Dewees St. with asphalt will be started shortly.

Paducah, Ky.—The county judge will call an election to vote on \$400,000 worth of bonds for construction of roads.

Monroe, La.—Special election is to be held to decide on bond issue of \$500,000 for good roads.

Monroe, La.—Plans are under consideration for street improvements, new schools, extension of sewer system, construction of filtering plant and rebuilding water and light plant. Walter G. Kirkpatrick, efficiency expert.

Center Moriches, L. I.—Elimination of

grade crossing of South Country Rd. by construction of tunnel under tracks will be recommended. Cost of change is estimated at about \$30,000.

Biddeford, Me.—No action has been taken on the sprinkling of streets.

Biddeford, Me.—The repairing of Kennebunk road is under consideration.

Baltimore, Md.—The United Railways has offered to pay \$100,000 toward paving of four streets if it can be done this year.

Boston, Mass.—Action is being taken on the repairing of several streets with granite blocks, wood blocks and asphalt.

Haverhill, Mass.—Repairs are contemplated on Winter and White Sts., though no appropriation has been made for same.

Milford, Mass.—Highways on Congress St., also in Purchase and School St. sections will be rebuilt under the supervision of state highway commission. F. C. Pillsbury is engineer.

Pittsfield, Mass.—Commission will build a mile or more of a concrete road 18 feet wide, starting at the easterly end of the Williamstown-North Adams highway, and proceeding towards Williamstown.

Sargus, Mass.—Lincoln Ave. is being repaired and streets are being oiled.

Sargus, Mass.—A special meeting has been called to ask for \$30,000 bond issue for the permanent improvement of streets.

Albert Lea, Minn.—The sidewalk bonds of the Albert Lea Construction Co. and for Hugo Stieler have been accepted.

Eveleth, Minn.—Contract for Lawrence McCann Co. has been extended to include paving Monroe St. Mesaba Railway Co. has been asked to use bitulithic in paving around depot.

St. Cloud, Minn.—Granite blocks will be used by Public Service Co. for paving between tracks and one foot on each side on St. Germain St.

St. Paul, Minn.—The paving of North Smith Ave. has been approved by City Council. Work was completed last summer at a cost of \$57,097.

St. Cloud, Minn.—City commissioners have decided on following paving program: Eight streets to be paved with creosote block, three streets with bitulithic, paving to be laid over on five streets.

St. Cloud, Minn.—City commissioners will purchase Peerless hand street sweeper.

St. Paul, Minn.—Council has approved ordinances for constructing and relaying sidewalks on several streets.

Biloxi, Miss.—E. L. Castanera, waterworks superintendent, has recommended construction of retaining wall of two feet with sloping beach for protection of beach highway.

Bude, Miss.—Bonds to the amount of \$35,000 for good roads are contemplated.

Canton, Miss.—City will receive bids until June 12 for approximately 5,300 sq. yds. pavement, brick, concrete, wood blocks or asphalt; 4 miles gravel macadam, 2½ miles concrete curb and gutter. Plans and specifications are on file. Walter G. Kirkpatrick, Birmingham, Ala. Engineer, W. L. Dinkins, Mayor.

Yazoo City, Miss.—Survey will soon begin for building of road between

Yazoo City and Silver City. Mr. Hathaway is the engineer.

Excelsior Springs, Mo.—Business men in this city are in favor of proposed bond issue for 202-mile rock road system for Clay County.

St. Louis, Mo.—Movement is on foot to widen Olive St. six feet, from 14th St. to Channing Ave., but cutting three feet off each sidewalk. Plan also contemplates paving Olive St. with wood block as far west as Grand Ave.

Hackensack, N. J.—City contemplates expenditure of \$40,000 for county road repair work.

New Providence, N. J.—It is proposed to resurface Springfield Ave. at a cost of \$13,422.

Newark, N. J.—Board of Street and Water Commissioners have signified their intention of paving and repairing several streets. M. R. Sherrerd is chief engineer.

Albany, N. Y.—Plans are being made for extension of Myrtle Ave. for about 800 feet.

Buffalo, N. Y.—Communications from a committee of property owners on Chapin Parkway protesting against condition of wood block pavement laid about six months ago, and urging that a disinterested expert be employed to examine specifications under which work was done and make such recommendations as may be necessary to improve pavement, has been transmitted to council. Matter was referred to a committee of five, with understanding that there will be hearing on protest just as soon as report on pavement is made by Captain Norton, engineering commissioner, who is making an investigation.

Canton, N. Y.—Plans have been submitted by state highway department for the construction of highway in the village at an estimated cost of \$7,100; also roads from Gouverneur to Edwards, estimated cost \$68,000, and from Depeyster to Oswegatchie, estimated cost being \$126,000.

Carthage, N. Y.—Improvements on West and Francis Sts. are under consideration of village board.

Herkimer, N. Y.—Renwick Ave. is to be paved with concrete. A petition has been presented for the extension of Suiters St.

La Salle, N. Y.—The paving of the River road through La Salle is being urged; there is over \$69,000 available for repairs in Niagara County.

Norwich, N. Y.—Special election will be held June 14 to vote on proposition appropriating nearly \$9,000 for good roads.

Oneida, N. Y.—Citizens have voted bond issue of \$7,100 for constructing pavement on Cedar St. Bids will probably be called for shortly.

Petersburg, N. Y.—New York state commission has decided to rebuild road between North Pownal and Petersburg this summer and work will be begun as soon as possible.

Rochester, N. Y.—Monroe County has available the sum of \$50,920 for the construction and improvement of highways.

Rochester, N. Y.—Final ordinances have been adopted as follows: Howell St. asphalt pavement and sewer, \$21,000; Marshall St. asphalt pavement and sewer, \$26,000; University Ave. asphalt pavement, \$6,700; Glendale Park care and embellishment, \$75; Karges Pl. asphalt pavement, \$3,500; Uhlen Pl. asphalt pavement, \$1,775; Riley Pl. asphalt pavement, \$3,500; Sycamore St. asphalt pavement, \$3,600; Fountain St. asphalt pavement, \$4,900; Crosman Terrace asphalt pavement, \$11,500; Bellevue Dr. asphalt pavement, \$5,000; Parkside Ave. asphalt pavement, \$10,500; Ellicott St. tree planting, \$210; removal of iron poles in Fillmore St. between West Ave. and Chili Ave., \$240; removal of iron poles in Hobart St. between West Ave. and Chili Ave., \$240; O'Neill St. asphalt pavement, \$4,000.

Syracuse, N. Y.—Lakeview Ave. will be extended to State Fair Boulevard, a temporary roadway will be laid to be replaced with a permanent pavement after the ground has settled.

Syracuse, N. Y.—Plans and specifications for grading, building a culvert at Harbor Brook and constructing a roadway are in preparation at office of City Engineer Henry C. Allen. Bids will be received and contract awarded with least possible delay.

Syracuse, N. Y.—An ordinance has been ordered for the resurfacing of several streets.

Utica, N. Y.—The signing of Governor

of Maier highway bill insures the building of Barnes Corners-Copenhagen Rd., plans for which are now in Albany waiting for approval by State Commission, and then to be approved by Lewis County Board of Supervisors, after which contract will be let, so that in all probability road will be under construction in about six weeks.

Concord, N. C.—County commissioners have awarded contract for bitulithic binder for Kannapolis road. Work will begin in a short time and it is expected that section of road from Concord to Cook's crossing will be completed within 30 days. Other section of the road will then be repaired. Binder will cost eight cents a square yard and, it is estimated, highway will measure 50,000 square yards.

Mount Airy, N. C.—Stewart's Creek township, Surry county, voted \$25,000 in bonds for road building.

Reldsville, N. C.—Expenditure necessitated by paving of Main St. will probably total about \$40,000. Half of this will be borne by property owners, and the other half assessed on municipality at large.

Wilmington, N. C.—Lenoir county commissioners are to contract out 30 miles at estimated cost of \$30,000; Washington township in Beaufort county is investing \$50,000 in new highways; Pitt, Jones, Craven, Carteret and others are expending or preparing to expend considerable sums, and Central Highway from coast to the main line of the Atlantic Coast Line will be put into model condition by co-operation of all counties through which it passes.

Cincinnati, O.—Commissioner Joseph Hermann has been directed to prepare plans and specifications for reconstruction of Tenth St. with vitrified brick. Purchasing Agent Hazelwood instructed to ask for bids for supplying steam roller to be used for street repairs.

Cincinnati, O.—Several streets are to be paved with water bound macadam.

Cincinnati, O.—An ordinance has been passed providing for the issue of bonds for \$5,700 to pay expense of widening Delta and Linwood Aves.

Cincinnati, O.—An ordinance has been passed to change width of roadway on Elberton Ave. from Bassett road to Price Ave.; also to change and establish the grade of Kessler Ave. from Carthage, 580 ft. west.

Coshocton, O.—Ordinance has been approved for improvement of alley extending north and south from Chestnut St. by paving with hard burned paving brick, setting curbs, and constructing sub-drains and catchbasins. O. S. Bower is city clerk.

Cleveland, O.—City council has passed ordinances providing for submission to voters of bond issues totaling \$6,500,000 for street improvements. If bonds are approved, taxpayers and county government will increase total to \$10,000,000. Bonds will be submitted at August primaries.

Columbus, O.—Ohio state highway commission is letting 48 contracts covering 94 miles of road at a cost of \$1,465,784.

Findlay, O.—Officials of Hancock county sold \$95,000 worth of road improvement bonds to Breed, Elliott & Harrison of Cincinnati for \$3,306 premium. Bonds cover improvements for eight roads in county.

Hamilton, O.—See "Bridges."

Ironton, O.—Engineer Howell reported it would cost \$3,000 to resurface Center St. with a coating of 2-ins. of asphaltic cement. Report was received and filed.

Middletown, O.—City Commission has ordered the construction of sidewalks, curbs and gutters on several streets, sidewalks to be 5 ft in width and to be of cement. W. P. Butterfield, Chairman of City Commission.

Mount Vernon, O.—Resolution authorizing construction of sidewalks in several streets has been approved by council.

Mount Vernon, O.—Resolutions have been approved by council for improvement of Mulberry St. by grading, draining, curbing and paving.

Niles, O.—Mayor has approved resolution authorizing construction of sidewalks on several streets. Homer Thomas is Clerk.

Tiffin, O.—A petition has been filed with the county commissioners for improvement of 4½ miles of Tiffin-Fostoria

road, ten per cent. of cost to be paid by owners of adjoining property.

Toledo, O.—It is proposed to repair 115 miles of highway and construct 33 miles of new roadway in the near future.

Urbana, O.—Council has voted again to change plans for Miami St. Instead of grade being changed street will be narrowed from 52 to 49 feet, making additional parking space on both sides of street of one and one-half feet.

Youngstown, O.—A resolution has been passed that plans, specifications, estimates and profiles of proposed improvements on Milton Ave. be approved.

Youngstown, O.—City will sell \$3,800 and \$38,150 road bonds June 19. Frank H. Vogan is clerk of board of Mahoning county comrs.

Tulsa, Okla.—Bids will soon be advertised for paving practically all the streets in Morningside and Maple Heights section. Contract will be one of the largest let in several years.

Beaver, Pa.—Ordinance for paving and parking of Seventh Ave., from Twentieth St. to Fetterman Bridge, has been passed on first reading.

Erie, Pa.—The city is contemplating the improving of several streets by grading, curbing, draining and paving. M. J. Henry is clerk city council.

Erie, Pa.—Ordinances introduced by Director Kinney for transfer of \$2,500 from street department operating fund to a fund for grading 28th St. from Parade to East Ave. Entire cost of work is slightly over \$3,000. Another ordinance establishes grade of 32nd St. from Reed St. to Wood Rd.

Hazleton, Pa.—Property owners on Broad St. favor wood block as material for work on that street.

Johnstown, Pa.—Ordinance has been introduced providing for grading, paving and curbing of Wood St. from Golde St. to southerly property line of the W. L. Powell property in the Seventh Ward. Asphalt on concrete base is material provided for in the ordinance.

Pittsburgh, Pa.—Report has been filed with Councilmanic Public Service and Surveys Committee by Real Estate Bd. in which board declares itself in favor of width of 60 ft. for West Carson St. from Point Bridge to Steuben St.

Windber, Pa.—It is proposed to widen all city streets at least 2 ft.

Wilkes-Barre, Pa.—Ordinance authorizing grading, curbing and paving of Wyoming St. with sheet asphalt will come up for final passage June 9. Fred H. Gates is city clerk.

Williamsport, Pa.—Campaign has been started to raise funds for construction of public road from Sylvan Dell to new state industrial home.

Williamsport, Pa.—City engineer has been authorized to get estimates on resurfacing the asphalt pavements on several streets.

Longmeadow, R. I.—Appropriation of \$3,000 has been made for tarring streets.

Providence, R. I.—Funds for the improvement of streets will be raised by bond issue.

Providence, R. I.—Money has been appropriated for the repairing and paving of several streets.

Providence, R. I.—City proposes the construction of an 80-ft. highway in South Providence district. The widening of Allen Ave. between Henderson and Cray Sts. is also under consideration.

Sumter, S. C.—West Liberty St. will be paved with bitulithic pavement; it will cost about \$1.75 per sq. yd.

Spartanburg, S. C.—Contract has been awarded for construction of concrete road along 16-ft. thoroughfare between Asheville and Black Mountain calling for an expenditure of \$30,000.

Columbia, Tenn.—A call has been issued for special meeting of Maury county court for purpose of considering proposition to county to buy turnpikes. Intention is to make all roads of county free to all travel.

Chattanooga, Tenn.—A movement is on foot for completion of paving Grand Drive.

Johnson City, Tenn.—Unicoi county has voted to issue \$100,000 bonds for good roads.

Knoxville, Tenn.—Premiums of \$2,262 have been paid for three bond issues, sold by city for property owners' part of paving improvement bonds since the first of the year. The \$50,000 park bonds brought \$4,000 premium. First issue was for \$28,000 of five per cent. five-year street improvement bonds, and were sold to W. W. Willis & Co. of Knoxville, for a premium of \$407.50. Second issue of \$26,000 similar bonds were bought by Paul Petty of Spartanburg, S. C., at a

premium of \$607.50. Third issue was sold to Farson, Son & Co. of New York for \$1,247. This issue was for \$28,000 six per cent. serial bonds falling due in one, two, three, four and five years.

Knoxville, Tenn.—Repairs on Magnolia Av. contemplated are the grading and macadamizing of about two blocks. Macadamizing of Heins Valley Rd. is also under consideration.

Lawrenceburg, Tenn.—Lawrence county's \$350,000 issue of road bonds, recently voted, have been sold to Mercantile Trust Co. of Jackson, Tenn., for premium of \$12,000, and an interest arrangement by which premium will be actually more than \$15,000.

El Paso, Tex.—East Blvd. will be paved at the estimate cost of \$55,306.59.

El Paso, Tex.—Estimates are being prepared for the paving of Texas St., Davis St., South Stanton St. and Ange St.

Wichita Falls, Tex.—Bond issue of \$40,000 for paving has been voted.

Ogden, Utah.—Board of commissioners will create 23rd St. between Wall and Washington Aves. as paving district and will pave roadway with 7 inches of concrete.

Salt Lake City, Utah.—Beck St. may be paved if designated by State Road Commission as a state highway. Cost of repaving is estimated at \$42,000, \$20,000 of which expense the state has agreed to bear.

Norfolk, Va.—County Commission is considering the purchase and improvement of toll roads.

Portsmouth, Va.—Kempville district, Princess Anne County, will spend \$130,000 for good and better roads as soon as money is available from bond issue which was authorized at recent election. Three thoroughfares to be improved and extended are Broad Creek, Water Works and Indian River roads. Broad Creek Rd. will be one of the links under in projected boulevard connecting Norfolk and Elizabeth City.

Richmond, Va.—Improvement of Hull St. is contemplated.

Richmond, Va.—City engineer has been authorized to advertise for bids for paving with smooth material the roadbed of Hanover Ave. between Robinson St. and the Blvd.; the roadbed of Perry St., from 10th to 12th, and the east side of Chamberlayne Ave., from Myrtle Ave. to Maplewood. Bids are returnable at noon on June 16. Also for bids for graveling the Manchester and Petersburg Pike with local or Massaponax gravel, from Maury St. to the present city limits.

Richmond, Va.—Councilmen are urging the finance committee to recommend a serial bond issue of \$500,000 for street improvements.

Richmond, Va.—Bids received by City Engineer Bolling for paving Fifth St. with granite spalls and asphaltic concrete were submitted to administrative board. The bids were referred to the city engineer for tabulation and report. The engineer is now receiving proposals for construction of a rail or fence to guard wall at 14th St. approach in Mayo's bridge.

Roanoke, Va.—Roanoke Highway Conference has been organized, the main purpose of which is construction and maintenance of general system of State roads in Virginia. Meetings were enthusiastic, and there was much discussion of road conditions, road improvement and maintenance of highways in this section of the country.

Spokane, Wash.—Hearing on proposed grading, curbing and sidewalking of Wellesley Ave. from Nevada to Addison set for June 12. Hearing on paving of alley between Fifth and Sixth Aves., and Adams and Cedar Sts. fixed for June 12 at which time tentative plans for Grand Blvd. sewer also will be considered.

Tacoma, Wash.—See "Sewerage."

Kenosha, Wis.—Bonds have been issued for \$210,000 for the completion of Sheridan road, a cement road of 6 miles.

Superior, Wis.—The commission passed number of resolutions providing for condemnation of wooden sidewalks and laying of nearly five miles of new standard cement walks in various parts of city.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates contract awarded.)

Del Paso Heights, Cal.—For improvement of Riverside Ave. from W to the city limits: *McGillivray Construction Co., at 10 3-10 cents per square foot.

Fairfield, Cal.—W. A. Dontenville of

Carmel for paving street with concrete, covered with two coats of asphalt, for \$46,671. Streets will be 16 ft. wide.

Pomona, Cal.—*Fleming & Son, for paving and curbing one block on North Park Ave. at cost of about \$2,250.

Stamford, Conn.—*William H. Arthur for paving three streets with sheet asphalt at \$1.71 per sq. yd., and for three streets with reinforced concrete at \$1.51 per sq. yd.

Wilmington, Del.—Bids have been received for paving of several streets as follows: Union Paving Co., Schenectady, N. Y., sheet asphalt, \$1.62; asphaltic concrete, \$1.67; asphalt block, \$2.85; Hastings vitrified block, \$2.63; Westport, \$2.73; Hillside concrete gutters, \$1.70; vitrified block gutters, \$2.63; vitrified block along rails, \$2.80; Hillside, \$2.90. Newton Paving Co., Trenton, N. J., sheet asphalt, \$1.70; asphaltic concrete, \$1.69; vitrified block, \$2.50; Mack concrete gutters, \$1.53; vitrified block gutters, \$2.50; vitrified block along rails, \$3.75. Hastings Pavement Co., New York, asphalt block, \$2.79; along rails, \$4.80. Warner-Quinlan Paving Co., Syracuse, N. Y., sheet asphalt, \$1.77; asphaltic concrete, \$1.74; vitrified block, \$2.45; wire cut, \$2.55; Hillside, concrete gutters, \$2.50; vitrified block gutters, \$2.50; vitrified block along rails, \$2.50; Hastings, \$2.65. Edwin C. Humphrey Paving Co., Hackensack, N. J., sheet asphalt, \$1.84; vitrified block along rails, \$3.80. Standard Bitulithic Co., New York, bitulithic, \$2.23; Warrenite, \$2.13; concrete gutters, \$1.80; vitrified block gutters, \$2.95; Mack, \$2.92; Westport, vitrified block along rails, \$3.47; Westport, \$3.50; Mack, \$3.50.

Atlanta, Ga.—*Cement and Tile Co. for furnishing tile for 1916 city work at 87 1/2 cts. per sq. yd.

Decatur, Ill.—*S. A. Tuttle, Decatur, Ill., for paving 33,000 sq. yds. 5-in. concrete base for \$55,098.52. Other bidders were: McCalenay Construction Co., Decatur, \$55,663.71; Tile & Alexander, Decatur, \$55,826.92, and Pronger & Fletcher, Blue Island, Ill., \$56,193.78.

Springfield, Ill.—Following contracts awarded for state roads: Section B, concrete road, 5,040 ft. from Lake Villa, *Anton Dudek of North Chicago, for \$12,506.60; section C, concrete road, 2,275 ft. out from Waukegan, *Anton Dudek, for \$4,681.53; *Ajax Construction & Engineering Co., Gary, Ind., \$11,291.58; *E. A. Lord Construction Co., Inc., Monmouth, Ill., \$4,877.74; *Hannan-McDonald Co., Chicago, Ill., \$8,146.91; *W. T. Bland, Cairo, Ill., \$18,114.41; *Benjamin F. Harrison, Decatur, Ill., \$27,120.42; *Cameron, Joyce Co., Keokuk, Ia., \$16,177.90.

Springfield, Ill.—Bids may be advertised for on contract let in the near future for the paving of South Ninth St. with brick.

Antwerp, Ind.—For Heazelet pike, Crane township, five miles, *Wilcox & Hiles, of Kenton, O., \$22,801.26; Minning pike, Crane and Emerald townships, 11 miles, *James Lynn, of Paulding, at \$52,470.80; Wabash canal pike, from Junction to Tate's landing, 5 miles, *James Lynn, Paulding, at \$27,132.85; Lehman pike, in Paulding and Crane townships, 4 miles, *James Lynn, Paulding, for \$18,269.20; Hash-Hanekratt pike, Emerald township, 5 1/2 miles, *C. W. Ryan, Maumee, O., at \$27,263.45; Sponseler-Ling pike, Auglaise township, 3 miles, *J. S. Blosser, of Cloverdale, O., for \$16,980.70; Klein-Yenser pike, 2 miles, in Auglaise township, *J. S. Blosser of Cloverdale.

Bluffton, Ind.—Bids received for paving several streets, D. O. North, Bluffton; Equitable Asphalt Co., C. E. Williams, Grand Rapids, Mich.

Fort Wayne, Ind.—*Minnick Construction Co., Newcastle, Ind., for paving Oak, Lama and North Main Sts., with Hocking wire cut paving block.

Indianapolis, Ind.—*Ewing Shields, Newcastle, Ind., for constructing concrete road for Marion county, at \$53,300.

Indianapolis, Ind.—*F. M. Dell Co., Indianapolis, for cement, at \$1.94 per barrel, joint protection plate, at 6 cts. Trussed Concrete Steel Co., reinforced metal square at 92 cts.; Breese Bros., for expansion joints, at \$3.18, \$3.72 and \$4.18 per lin. ft.

Indianapolis, Ind.—*Ewing-Shields Co., Greencastle, Ind., for concrete road at \$38,300.

Kokomo, Ind.—*Charles Winburn, for oiling South Armstrong St., at \$267.10; East Monroe St. at \$387.62, and Maple St. at \$42.82.

Kokomo, Ind.—*J. H. Watson & Son for paving Carter Alley with concrete at \$1.27 per sq. yd., and Tudor Alley

with Metropolitan brick at \$1.71 per sq. yd.

La Porte, Ind.—Highway improvement bonds, par value of \$8,400, dated April 15, 1916, will be offered for sale on June 14, 1916. Carl Pusch, Treasurer La Porte County.

Muncie, Ind.—For the Barnard road, Monroe township: *Thornburg, Petro & Ross for \$9,869.20, stone; Jessup road, West River township, *Johnson & Dull, assigned from above named contractors, for \$7,336.40, stone; Conning road, Greensfork Township, *Johnson & Dull for \$11,750, stone; Croyle road, Jackson township, *Harry Ihlf, for \$1,910, to be gravel.

Muncie, Ind.—*A. F. Cohoe, Frankfort, Ind., for paving Dow Rd., with concrete at \$31.311. Estimated cost, \$45,560. *J. M. Snyder, Frankfort, Ind., for paving the J. Ed. Johnson Rd., 2 miles long, with brick, at \$40,495; estimated cost, \$62,820; for F. M. Thomas Rd., at \$10,500, estimated cost \$13,880; for Jonas Hensley Rd., in Mt. Pleasant twp., with gravel, at \$7,800, estimated cost, \$14,855; Christian L. Pence Rd. in Monroe twp. with gravel, at \$9,400, estimated cost, \$12,000; William F. Kirklin Rd. in Perry and Monroe twps. with gravel at \$7,140, estimated cost \$12,966.

North Vernon, Ind.—Bids received for paving streets with concrete, 4,732 sq. yds.: James De Golyer, Seymour, Ind., \$1.32 per sq. yd., total bid \$7,774; Jefferson County Construction Co., Louisville, Ky., \$1.44 per sq. yd., total bid \$8,144; J. W. Miller, North Vernon, Ind., 2-course concrete, \$1.46 per sq. yd.; Ewing Shields, Seymour, Ind., 2-course concrete, \$1.44 per sq. yd. Bids open to July 3 for 15,533 sq. yds. of brick.

Richmond, Ind.—For concrete roadway, sidewalks, curbs and gutters on Southwest Ninth St., from National Rd. to Southwest A St.: *F. E. Slick, at 50 cts. a lineal foot for walks, 65 cts. a lineal foot for curbs and gutters, and \$1.81 a square yard for concrete roadway.

South Bend, Ind.—For improvements on Indiana Ave. from Kimble Ave. to Prairie Ave.: *W. B. Brady Co., Chicago. Thoroughfare will be paved with asphaltic concrete. For grading and graveling of Pokagon St.: *H. L. Davis Co., South Bend.

Warsaw, Ind.—*Warsaw Construction Co., for about two miles of brick paving.

Marshalltown, Ia.—For paving as follows: *Western Construction Co., Sioux City, Ia., 44,850 sq. yds. concrete paving, at \$1.28 1/2, 2,370 sq. yds. brick paving, at \$2.28, 25,450 lin. ft. curbing at 32 cts. per ft., 2,500 cu. yds. extra grading, at 40 cts. per ft., 9,930 sq. yds. 16-ft. concrete paving district No. 1, at \$1.26 1/2; A. Carlson, Marshalltown, Ia., at \$1.34, 2,080, 30 cts., 40 cts., \$1.34, respectively; Thos. Carey & Sons, at \$1.53, \$2.25, 33 cts., \$1.55, respectively; Akin & Flatter, Conning, Ia., at \$1.36 1/2, \$2.12 1/2, 33 cts., 50 cts., \$1.36 1/2, respectively; G. H. Dettler, Boone, Ia., at \$1.41 1/2, —, 31 1/2 cts., \$1.46, respectively; E. B. McNamara, Dubuque, Ia., at \$1.44 1/2, \$2.21, 43 cts., 60 cts., \$1.45, respectively.

Waterloo, Ia.—Bids will be asked on sheet asphalt, creosote blocks or brick for repaving.

McPherson, Kans.—For 40,895 sq. yds. asphaltic concrete pavement on 4-in. concrete base, 7,610 cu. yds. black soil excavation as follows: *Watts & Amerman, Salina, Kans., at \$1.22 per sq. yd. paving, 28 cts. per cu. yd. excavation, total \$65,982.40; Security Paving Co., Kansas City, Mo., at \$1.22 and 30 cts., respectively, total \$70,944.04; Kaw Paving Co., Topeka, Kans., at \$1.23 and 32 cts., respectively, total \$71,127.39; E. D. Tyner, Kansas City, Mo., at \$1.27 and 30 cts., respectively, total \$73,586.43.

Wichita, Kan.—*H. L. Miles, Wichita, for paving street and railway track with brick, 6-in. concrete base, for \$30,000, 18-in. base railway tracks: *Globe Construction Co., Wichita, for paving street with brick, 5-in. concrete base, for \$3,000; *Williston Construction Co., Wichita, for paving street with brick, 5-in. concrete base, for \$13,000.

Louisville, Ky.—*Southern Asphaltoline Road Co. for oiling streets at \$37,100.

Louisville, Ky.—*J. H. Cahill for improving with vitrified brick F St., Grand Ave., Brandeis St. and 32nd St., for \$37,000.

Paducah, Ky.—*Fred Beyer, for building 2 miles of road, at \$5,181.52. Other bidders were: *Harry Ross, \$5,709.07; Cresap Bros., \$6,903.15; Durrett Construction Co., \$7,118.13. For constructing bridge: Durrett Construction Co. of Johnson, local firm, at \$1,587.48.

Great Barrington, Mass.—*George A. Stevens, for all cement to be used in

construction of sidewalks in fire district. Price will be \$1.75 per barrel. Flynn will install three hydrants near the shore of lake at Brookside for fire protection purposes.

Port Huron, Mich.—James H. Baker & Sons of Port Huron for paving Pine Grove Ave. and Elmwood St.

Saginaw, Mich.—Cleveland Trinidad Paving Co. for paving State St. All other bids rejected and work deferred till next season. H. S. Gay, City Clerk.

New Brunswick, N. J.—Abraham Jellicoe of New Brunswick, N. J., for repairing Codwise Ave. for \$7,260. *Abram Voorhees of New Brunswick, N. J., for reinforcing barn into a pavilion for \$2,615.

Buffalo, N. Y.—For building of Branch Center reservation road. Cold Spring Construction Co., \$16,800; Harrison Engineering Construction Co., \$11,290; Sweetney & Boland, \$12,473.

Lockport, N. Y.—C. E. Balcolm of Youngstown for placing 1200 yds. of gravel on the Creek road, 93.9 cts. *G. H. Cochran of Porter for 700 cu. yds. at 99 cts. on Lake road.

Lockport, N. Y.—Fillmore Chapel-Ransomville road in Porter and Lewiston. *William F. Felton, Buffalo, \$47,561.94. Beebe Road-Chestnut St. in Wilson, Busch & Percival, Kenmore, \$48,201.14. Pendleton Wheatfield Town Line road in Pendleton and Wheatfield. *F. J. Mumm Contracting Co., Inc., Buffalo, \$17,149.

Long Island City, N. Y.—Bids will be advertised for soon for the paving of several streets in College Point, cost of which will be over \$100,000. Bids will also be received for paving with concrete Jerome Ave. from Hatch Ave. to Greenwood Ave., Woodhaven. Cost, about \$50,000.

Rochester, N. Y.—Bids have been received on following: Epworth St., asphalt; McKinley St. sanitary and stormwater sewers; Parsells Ave. sanitary and stormwater sewers; Devonshire Court walks, grading and sewer; Dryer Alley, asphalt; Melville St., sanitary and stormwater sewers, and walks in Main St. East.

Rochester, N. Y.—Improvement contracts have been awarded as follows: Franklin Square: asphalt pavement, *Rochester Vulcanite Pavement Co., \$11,266; Colonial road sewer, walks and grading, *John Petrossi, \$15,807.50; Ravenwood Ave. asphalt pavement, *Whitmore, Rauber & Vicinus, \$15,881; Saxton St. brick pavement, *Frank V. Brotsch, \$4,935.50; laying water pipe in Group 269, *James Passero, \$1,659.10; laying water pipe in Group 270, *W. E. Kinney & Co., \$1,075.50.

Rome, N. Y.—The following bids for bitulithic pavement have been received from Warren Bros. Co. of Boston: W. Park, \$11,573.38; Parry, \$7,185.30; E. Bloomfield, \$7,113.86; Roberts, \$10,263.20; W. Bloomfield, \$5,417.40; W. Thomas, \$10,097.40; E. Thomas, \$9,260.48. The bids were referred to city attorney and city engineer for approval.

Syracuse, N. Y.—Bids received: M. E. Webb at \$22.50 per thousand, and J. A. Gallagher at \$21 per thousand for paving brick to repair old pavements.

Waterloo, N. Y.—McMahon & Farrington for paving Virginia and West Main Sts. with reinforced concrete, for \$44,762.66.

Marion, O.—Asphalt Block Paving Co., Toledo, O., for paving Carhart St., at \$6,742.79, engineer's estimate being \$6,644.55; Forest St. with 2½-inch asphalt block, at \$11,430.03, estimate of engineer being \$11,347.80; Bain Ave. at \$7,587.74, engineer's estimate being \$7,435.90.

Marion, O.—For paving of Davids St., exclusive of that portion to be paved by the C. D. & M. Railway Co., *Brady & Drake, at \$49,648.93, metropolitan block to be used. Estimate of city engineer was \$52,821.25. Brady & Drake were also given contract for paving of that portion of street for the C. D. & M. Railway Co., bid being \$12,847.60 for wire cut or repressed block. *Brady & Drake, for paving of Avondale Ave. with Lincoln block. Their bid was \$12,179.43 and estimate of city engineer was \$12,782.20.

New Paris, O.—W. E. Jones for oiling streets, at 2-3 cts. per square yard.

Tiffin, O.—Bids received for paving, brick, 17.73 cu. yds.: John E. Kiz of Tiffin, 40 cts. per cu. yd., and Louis Schauder of Tiffin, 45 cts. per cu. yd. Two streets will use crushed stone base, and one street monolithic. Stone, \$1.50 cu. yd.; brick, \$1.02 for labor and material.

Tiffin, O.—Louis Schauder for paving Apple St., crushed stone foundation, \$11,041.50, and Douglas St., concrete foundation, \$6,035.75. *John E. King for East Perry st., crushed stone foundation, \$14,336.90. All three streets will be paved with Trimble block. *Martin Schauder, for construction of Rosa St. and Walker St. overflow sewers.

Youngstown, O.—City Council has approved awarding of city improvement bonds aggregating \$31,895. Bidders were Mahoning National Bank and Breed, Elliott & Harrison, of Cincinnati.

Monmouth, Ore.—Hobson V. Hoskins of McMinnville for paving three blocks on Main St., for \$7,917.67.

Hazleton, Pa.—State Paving Co., \$26,275.84; Hassam Paving Co., \$26,944.50; John A. Leffler, \$6,160 for paving streets.

Hazleton, Pa.—For paving as follows: Broad St.—Hassam Paving Co., Worcester, Mass. Mexican asphalt, \$2.05 per yd.; Bicmac, \$1.65, resurfacing with vitrified brick, \$1.40. Work to be guaranteed for 5 years and contract to be completed within 90 days. Warner-Quinlan Asphalt Co., Syracuse, N. Y., Monessen asphalt, \$1.84 per sq. yd.; to be completed within 90 working days. John A. Leffler, Jamison Heights, wood block on concrete base, \$3.34; on old base, \$2.44; U. S. wood-preserving block, \$3.32, on old base, \$2.52; Ohio wood preserving block \$3.54; on old base, \$2.64. On brick the bids were as follows: Mack, \$2.54; Toronto, \$2.58; Porter, \$2.57; Penna. clay, \$2.49; C. C. W., \$2.51; Mayer, \$2.52; Metropolitan, \$2.57; on old base, Mack, \$1.64; Toronto, \$1.68; Porter, \$1.67; Penna. clay, \$1.59; C. C. W., \$1.61; Mayer, \$1.62, and Metropolitan, \$1.67; the work, if awarded the contract, to be completed within 60 days. State Paving Co., Wilkes-Barre, Pa., Toronto, \$2.58; Globe, \$2.59; Bessemer, \$2.60; Penna. clay, \$2.60; Barber asphalt, \$3.11; Trinidad Lake, sheet, \$2.10; Mexican oil, sheet, \$2; Trinidad, Topeka, mixed, \$1.88; Mexican oil, mixed, \$1.82; Amesite, \$1.80; resurfacing, Mexican oil, 98 cts.; sheet asphalt, Trinidad Lake, \$1.24. Diamond Ave.—J. B. Trexler, Reading, Mack, \$2.91; Porter, \$2.90; Toronto, \$2.93; Metropolitan, \$2.91; Clearfield, \$2.80; Mayer, \$2.86; U. S. wood block, \$3.38; Ohio wood block, \$3.47; Jamison Wright wood block, \$3.36; asphalt macadam, \$2.33; Barber asphalt, \$3.22. M. J. Malloy, Sugar Notch, Mack, \$2.35; Toronto, \$2.35; Bessemer, \$2.45; Penna. clay, \$2.35; Amesite, \$1.87. *State Paving Co., Wilkes-Barre, Pa., Toronto, \$2.58; Globe, \$2.59; Bessemer, \$2.60; Penna. clay, \$2.60; Barber asphalt, \$3.11; Trinidad Lake, sheet, \$1.88; Mexican oil, \$1.71; Trinidad, mixed, \$1.58; Mexican, mixed, \$1.52; Hassam Bicmac, \$1.82; *Amesite, \$1.80. Warner-Quinlan Asphalt Co., Monessen sheet asphalt, \$1.97. John A. Leffler, Mack, \$2.43; Toronto, \$2.46; Porter, \$2.45; Penna. clay, \$2.38; C. C. W., \$2.40; Mayer, \$2.41; Metropolitan, \$2.45; Amesite, \$2.03. Hassam Paving Co., Mexico, \$2.45; Bicmac, \$2. Hospital Hill.—*John A. Leffler, Amesite, using sheet foundation, \$1.04. Hassam Paving Co., Bicmac, \$1.65. Pasquale Pacenza, Watstown, \$2.25; Mack, \$2.35; Porter, \$2.37; C. C. W., \$2.34; Ohio wood block, \$2.95; U. S. wood, \$2.95; Amesite, with concrete base, \$2.03; work to be completed in 110 working days. M. J. Malloy, Sugar Notch, bid on brick, same as on Diamond Ave.; Amesite on concrete base, \$1.87. State Paving Co., same as bid on Diamond Ave.

Lebanon, Pa.—For paving, as follows: Lehman St., Ninth to Eleventh and Ninth St., Scull to Lehman. *Mangen & Pugh, Eighth St., north of Mifflin and the entire paving work in Seventh St., Cumberland to city limits, *Dwyer & Co., Philadelphia.

Lewistown, Pa.—W. D. Steimbach Sons for paving Logan St. at \$2.09 per sq. yd., Watstown No. 1 brick to be used. Bids for paving were as follows: W. D. Steimbach Sons, Lewistown—retaining stones, 30 cts. per lin. ft. Clearfield blocks, \$2.06 per sq. yd.; Watstown blocks No. 1, \$2.09 per sq. yd.; Gregory Paving Co., Lewistown—Retaining stone, 40 cts. per lin. ft. Clearfield blocks, \$2.14 per sq. yd.; Watstown blocks, No. 1, \$2.12 per sq. yd.; Watstown blocks, No. 2, \$2.06 per sq. yd.; Mack blocks, No. 1, \$2.30 per sq. yd. J. B. Trexler, Reading—Retaining stones, 50 cts. per lin. ft. Clearfield blocks, \$2.21 per sq. yd.; Watstown blocks, No. 1, \$2.23 per sq. yd.; Mack

blocks, No. 1, \$2.32 per sq. yd.; Patton blocks \$2.36 per sq. yd.; Metropolitan blocks, \$2.36 per sq. yd.; Toronto blocks, \$2.36 per sq. yd.

Reading, Pa.—Fehr & O'Rourke for paving several streets with vitrified blocks for \$30,377.70. Other bidders were J. B. Trexler, Union Paving Co., and Newton Paving Co.

Reading, Pa.—Hassam Paving Co., for paving with asphalt and wood block for \$88,057.08. Other bidders were: Newton Paving Co., \$97,355.80; Union Paving Co., \$96,973.07; Warner-Quinlan Asphalt Co., \$103,200.93 and Central Construction & Supply Co., \$100,559.20.

Portsmouth, Va.—Bids for laying 8,000 sq. yds. of granolite sidewalks will be advertised for.

Union City, Pa.—John McCormick & Sons, Erie, Pa., for paving South St. at \$11,079.04.

Lonsdale, Tenn.—John J. Connor & Bro., for macadamizing, grading and draining 18 streets at \$18,000.

Nashville, Tenn.—Sam E. Finley of Atlanta, for approximately 700,000 gallons of Mexican asphalt oil at an average price delivered to four counties of .04898 cts. per gallon, or a total of \$34,285. The oil is heavy asphaltic oil, and will be used in surface treating state highways in Davidson, Hamilton, Knox, Madison and Shelby counties, while from 10,000 to 30,000 was included for several small towns. Standard Oil Co. of Louisiana was next lowest with an average bid of .05696, or an aggregate bid of \$39,886.

Beaumont, Tex.—For construction of Mansfield Ferry Rd. south of city and leading to Orange county. *Neches Shell & Dredging Co., at \$1.55 per cu. yd. of shell. About 2,500 cu. yds. will be used. *J. M. Gregg, for hauling and placing material, at bid of \$3,800.

Galveston, Tex.—Bids have been received from P. J. Vautrin, Freund & Quay, Ed Ringer, Ed. F. Drewa, Thad Parsons and H. J. Hetkes covering concrete curbs, coping and sidewalks adjoining and around Menard Park.

Richmond, Va.—Javi Perkins, for granolithic sidewalks around Confederate Navy Park.

Spokane, Wash.—Spokane Bitu-Mass Paving Co., for paving Apple Way at \$26,151; *Standard Asphalt Paving Co., Spokane, for paving Mead Rd. at \$12,961.

Tacoma, Wash.—Henry J. Kaiser, Everett, Wash., for 55,576 sq. yds. bitu-concrete pavement on 5-in. concrete foundation, earth excavation at \$95,970. D. H. White is Co. Engr.

Tacoma, Wash.—An ordinance has been passed for paving National Ave. Bids will be opened June 5.

Racine, Wis.—L. L. Tindell, Watford, Wis., for building Caldwell and Rochester-Burlington roads. Price for grading on Caldwell road was 49 cts. a yard, and 52 cts. per yard for surfacing. Concrete work on bridges for both highways was \$10.50 per cubic yard. Grading for the Rochester-Burlington road was let at 49 cts. a yard and surfacing 51 cts. a yard. The contract for Hewitt bridge was awarded to Burlington Bridge Co. for \$448. Board also secured prices for cement and oil. Cement men of city all submitted a price of \$1.53 net. Oil prices were received ranging from 4 to 8 cts. a gallon.

Superior, Wis.—Bids received for paving 21st and 24th Sts. with reinforced concrete are as follows: Twenty-first St.—John Diffor, crushed rock, \$4,716.02; gravel, \$4,464.12; trap rock, \$5,278.27. Magnus Peterson, gravel, \$5,026.37. Palmer Construction Co., trap, \$5,933.90; gravel, \$5,832.56. Russell Construction Co., trap, \$4,955.70. Twenty-fourth St.—John Diffor, crushed rock, \$6,029.86; trap, \$6,360.36; gravel, \$6,765.61. Magnus Peterson, trap, \$7,096.11. Palmer Construction Co., trap, \$7,959.64; gravel, \$7,836.34; Russell Construction Co., trap, \$6,781.95.

Winnipeg, Canada.—Hirst Engineering Co., for sewers on Rosebury, College, Marjorie and Parkview Sts., at \$15,834.

SEWERAGE

Los Angeles, Cal.—Indorsement of plans for establishment of joint sewage system for Alhambra, Pasadena and South Pasadena has been given by C. G. Gillespie, director of bureau of sanitary engineering for state board of health.

Los Angeles, Cal.—Bond issue for \$1,800,000 for sewers has been approved.

Redding, Cal.—City has filed application with State Board of Health for per-

mit to deposit sewage on Bassett farm. Request is made in connection with sanitary improvements the city has under consideration.

South Stockton, Cal.—The work on sewer in the city will soon be completed. **Stockton, Cal.**—Plans and specifications have been adopted for the construction of sewers on several streets. When the installation of this system is finished it practically completes the sewer work, the estimated cost is \$48,577.

Pueblo, Col.—City Engineer Gamon will recommend to the commissioners that they accept the bid of P. J. Ryan for the construction of an 8-in. sanitary sewer in Avondale at \$440.89.

Bridgeport, Conn.—Bids will be opened shortly for construction of sewers in several streets.

Quincy, Ill.—City will repair old drainage system.

Springfield, Ill.—Council has already passed ordinance for placing of an 18-in. vitrified crock pipe sewer in Peoria Rd., from Ridgely to Sangamo Ave., at estimated cost of \$4,665.06.

Elwood, Ind.—A new sewer 1,326 ft. long will be constructed along new channel of Duck Creek. Plans specify three sizes of tile, from 24 to 30 ins., but council favors larger one.

Fort Wayne, Ind.—S. L. Sheets Construction Co. will complete big main sewer in southeastern portion of city. Sewer in Hanna St. is to be repaired.

Mishawaka, Ind.—Petition has been granted for sewer main on Baker St.

Portland, Ind.—Sewer on East Water St. and water main on East Third St. are to be repaired.

Waterloo, Ia.—Water, sewer and gas committees met at city hall to consider plans for sewerage system for Galloway, Westfield, Hagerman and Downing additions. The committee will have re-June.

Waverly, Ia.—Comstock & Hanson, Cedar Rapids, Ia., for supplying salt-glazed vitrified pipe sewer.

Monte, La.—See "Streets & Roads."

Albert Lea, Minn.—Sewer committee has matter of putting in sewer on West William St. under consideration.

Laurel, Miss.—Laurel municipal bonds in sum of \$25,000 have been purchased by Kaulman, Smyth and Emert Investment Co. of St. Louis. Purchasers paid premium of \$725 for issue. Bonds were sold to provide \$15,000 for establishment of municipally owned agricultural fair and to provide funds for laying of additional sewers and water mains in certain streets which are to be paved during the year.

Harlowton, Mont.—The Minnesota Loan & Trust Co., of Minneapolis, have bought bonds for sewers at \$25,000, plus \$1,375 premium, with interest at 6 per cent. per year, from the town of Harlowton.

Camden, N. J.—City will construct sewer in Cope St. A. L. Sayers is street commissioner.

Batavia, N. Y.—See "Water Supply."

Syracuse, N. Y.—Plans for construction of several sewers are being discussed.

Cincinnati, O.—An ordinance has been passed providing for issue of bonds for \$11,900 for the purpose of improving by sewerage ravine from point near northeast corner of Hyde Park East subdivision to Duck Creek interceptor near Red Bank road.

Sandusky, O.—Ordinance has been passed authorizing the improvement of Market St. by constructing sewer. J. E. Westcott is clerk.

Tiffin, O.—See Streets and Roads.

Youngstown, O.—There is a resolution on construction of sewers on several streets.

Tulsa, Okla.—Sewer bond issue of \$100,000 has been sold to Piersol Co., Oklahoma City, for sum of \$103,000 and bids will be called for in the near future.

Erie, Pa.—Petition received from property owners in 27th St., between Cascade and Raspberry Sts., asking construction of a sanitary sewer, was referred to B. E. Briggs, city engineer, to prepare data.

Harrisburg, Pa.—Among the permits and decrees issued by the Pennsylvania Department of Health relative to sewerage during the period from May 1 to 31, 1916, inclusive, were the following: Sewerage—Altoona—Approving plans for district sanitary sewer system. Carbondale—Approving lateral sanitary sewers and temporary outlet and requiring revision of sewage treatment plans. Rosslyn Farms—Approving sanitary sewer extensions and requiring comprehensive sanitary sewerage plans and

joint disposal studies. Washington—Approving plans for a comprehensive sanitary sewer system tributary to existing disposal plant. Mifflin Township, Allegheny county (Pittsburgh-Kennywood Park County)—Sewage treatment. Braddock—Approving preliminary plans for comprehensive sanitary sewer system and change of temporary outlet. North Braddock—Approving plans for comprehensive sanitary sewer system and change of temporary outlet. Philadelphia—Approving lateral sewer extensions. C. A. Emerson, Jr., acting chief engineer.

Hazleton, Pa.—Construction of sewer line in Arthur St. is contemplated at cost of about \$8,000. Of this city school district would pay \$1,500, it being suggested as being required for a sewage disposal plant. This money will be paid over to city and work of erecting sewer started at once.

Providence, R. I.—There is a petition in for sewer in Longfellow St.

Westerly, R. I.—Meetings of taxpayers was held recently at which proposed sewerage system was explained to voters. Plans were favored by 90 per cent. of those present.

Mineral Wells, Tex.—Bonds for \$23,000 for sewerage disposal will be issued.

Port Arthur, Tex.—City Engineer has been asked to furnish a map of present sewer system to aid in plans for extension of the city's sewer system. Cost of extensions not to exceed \$100,000. D. K. Miller is City Engr.

Ogden City, Utah.—City contemplates the improvement of several streets with sewerage and water service at an estimated cost of \$35,000. Meeting will be held June 19 for consideration of same.

Richmond, Va.—Trunk sewer through Woodland Heights and Swansboro will be extended.

Tacoma, Wash.—City council has passed ordinances providing for establishing storm sewers in district 1,110, Wapato: cement concrete sidewalks on North Anderson St., on North 17th St., and to resurface pavement on North L St.

Superior, Wis.—Resolutions have been introduced, determining to issue bonds to pay special assessments for construction of several sewers.

BIDS RECEIVED AND CONTRACT AWARDED.

*Indicates contract awarded.

Stockton, Cal.—W. S. Gause for construction of relief storm water sewers in different parts of the city. Work is progressing rapidly.

Marshall, Ill.—*Oliver & Wheeler, Le Roy, Ill., for sewer on Beach St., at \$3,433.

Frankfort, Ind.—Bids received: Scully & Koontz, Chicago, Ill., for sewer construction, vitrified tile, 150 ft. 10 in., 64 cts., and 80 cts. per ft., 75 cts. for branches; 1,740 ft. 12-in., 77 cts. per ft., \$1 for branches; 640 ft. 15-in., \$1.03 per ft., \$1.50 for branches. Repaving on excavation with brick on concrete, \$1 65 per sq. yd.; eight manholes at \$40 each.

Sac City, Ia.—*Jack Placach, Sac City, Ia., for 3,900 ft. sanitary sewer at \$4,000.

Sioux City, Ia.—*W. B. Carter, for sanitary sewers in Helen St. and Ridge Ave.

Blideford, Me.—*F. A. Rumery Co., Portland, Me., for sewer, Amco segment block, 37x49, 1,500 ft., for \$16,628.

Eveleth, Minn.—Bid of James B. Clow & Sons, of Minneapolis, for furnishing city with 1,000 ft. of lead pipe was accepted and city engineer authorized to place order for it.

Canton, Miss.—City will receive bids until June 12 for 2,600 ft. pipe storm sewers, 18-36" diameter. Plans and specifications are on file. Walter G. Kirkpatrick, Birmingham, Ala., Engineer; W. L. Dinkins, Mayor.

Newark, N. J.—*C. A. Haskin, Boston, Mass., for south part of Sec. 27, tunnel method, at \$92,280. *W. J. Coughlin, Jersey City, N. J., for open trench, at \$91,940.

Binghamton, N. Y.—For section 1 of intercepting sewer system: *Sewage Disposal & Water Plant Co. of Schenectady, for \$142,000.

Oriskany, N. Y.—Village board has decided to advertise for sealed proposals for purchase of \$40,000 of sewer bonds. The bonds will be issued in denomination of \$1,000 each, bearing interest at 4 per cent, payable semi-annually. Bids will be opened June 12.

Blideford, Me.—*F. A. Rumery Co., Portland, concrete, \$19,980; pipe, \$16,628 for new sewer. Other bidders: Frank Drinkwater, Portland, concrete, \$30,900,

*Glidden & Hobbs, Lawrence, Kans.									
Engineers' Estimate		Price		Amount		Erickson Bros. Lindsborg, Kans.		Snyder & Ahart, Salina, Kans.	
Quantities, Unit, Kind of Work.		Price		Amount		Price		Amount	
20,528 lineal ft. curb and gutter.		.50		10,264.00		.46 1/2		9,545.52	
16 catch basins, each.		10.00		160.00		12.75		204.00	
1,300 lineal ft. 21-in. V. P. sewer.		1.40		1,820.00		1.45		1,885.00	
1,950 lineal ft. 15-in. V. P. sewer.		1.00		1,950.00		1.00		2,050.00	
1,260 lineal ft. 12-in. V. P. sewer.		.60		756.00		.70		1,365.00	
480 lineal ft. 8-in. V. P. sewer.		.25		120.00		.49		617.40	
Totals.		16,120.00		144.00		.45		216.00	
Name of Bidder and Post Office Address.									
Quantities, Unit, Kind of Work.									
20,528 lineal ft. curb and gutter.		.85		11,290.40		.47		9,958.08	
16 catch basins, each.		14.00		224.00		12.00		192.00	
1,300 lineal ft. 21-in. V. P. sewer.		1.60		2,080.00		1.58		2,054.00	
1,950 lineal ft. 15-in. V. P. sewer.		1.30		2,665.00		1.39		2,845.50	
1,260 lineal ft. 12-in. V. P. sewer.		.85		1,657.50		1.00		1,950.00	
480 lineal ft. 8-in. V. P. sewer.		.40		192.00		.77		970.20	
Totals.		18,864.90		240.00		.45		216.00	
*Contract awarded.									
Name of Bidder and Post Office Address.									
Quantities, Unit, Kind of Work.									
20,528 lineal ft. curb and gutter.		.46 1/2		9,545.52		.46 1/2		9,545.52	
16 catch basins, each.		10.00		160.00		12.75		204.00	
1,300 lineal ft. 21-in. V. P. sewer.		1.45		1,885.00		1.45		1,885.00	
1,950 lineal ft. 15-in. V. P. sewer.		1.00		2,050.00		1.00		2,050.00	
1,260 lineal ft. 12-in. V. P. sewer.		.60		756.00		.70		1,365.00	
480 lineal ft. 8-in. V. P. sewer.		.25		120.00		.49		617.40	
Totals.		16,120.00		144.00		.45		216.00	
Name of Bidder and Post Office Address.									
Quantities, Unit, Kind of Work.									
20,528 lineal ft. curb and gutter.		.46 1/2		9,545.52		.46 1/2		9,545.52	
16 catch basins, each.		10.00		160.00		12.75		204.00	
1,300 lineal ft. 21-in. V. P. sewer.		1.45		1,885.00		1.45		1,885.00	
1,950 lineal ft. 15-in. V. P. sewer.		1.00		2,050.00		1.00		2,050.00	
1,260 lineal ft. 12-in. V. P. sewer.		.60		756.00		.70		1,365.00	
480 lineal ft. 8-in. V. P. sewer.		.25		120.00		.49		617.40	
Totals.		16,120.00		144.00		.45		216.00	
Name of Bidder and Post Office Address.									
Quantities, Unit, Kind of Work.									
20,528 lineal ft. curb and gutter.		.46 1/2		9,545.52		.46 1/2		9,545.52	
16 catch basins, each.		10.00		160.00		12.75		204.00	
1,300 lineal ft. 21-in. V. P. sewer.		1.45		1,885.00		1.45		1,885.00	
1,950 lineal ft. 15-in. V. P. sewer.		1.00		2,050.00		1.00		2,050.00	
1,260 lineal ft. 12-in. V. P. sewer.		.60		756.00		.70		1,365.00	
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pipe, \$29,900; J. A. Benoit, Biddeford, concrete, \$27,502; pipe, \$25,988.50; J. H. Ferguson, Boston, concrete, \$25,141, pipe, \$24,141; Otto Nelson Co., Bangor, concrete, \$25,520, pipe, \$24,418; Prone & Co., Portland, concrete, \$45,500, pipe, \$42,500; George Scamman, Saco, concrete, \$27,000, pipe, \$4.90 per yard.

Rochester, N. Y.—See Streets and Roads.

Middletown, O.—Berry Bros., for sanitary and storm sewer in Sutphin Ave., at \$1,200 and sewer in McKinley Ave. at \$1,300. C. E. Morrison is city engineer.

Marshallfield, Ore.—Edward Sandberg, of Portland is lowest bidder of 12 for Myrtle Point sewer project. His bid is \$14,567.

Milwaukee, Wis.—John F. Casey Co. of Pittsburgh, for west side low level sewer, \$470,441.39. Next lowest bidder was J. F. Ferry & Son of Baltimore, at \$482,055.

WATER SUPPLY.

Auburn, Cal.—City may consider purchase of water distributing system when appraisement is made by the present owners, Pacific Gas & Electric Co.

Redding, Cal.—A chlorination plant has been installed to purify water supply.

Boulder, Colo.—City water department is making preparations to construct a 12x16 concrete surge chamber or deaerating basin on mountain side in Boulder canyon.

Lyons, Colo.—C. S. Burford, a wealthy Lyons ranchman, has completed plans for the reclamation and irrigation of Bell flats, a 3,000-acre tract of land situated two miles due east of town. Plans and specifications for Burford's irrigating system have been completed by L. H. Dietrich, the local engineer, and bids for the preliminary construction work amounting to \$10,000, were advertised for recently. Construction work includes 150-foot outlet tunnel from Long lake with concrete bulkhead and outlet tube at the lake, an outlet ditch at Green lake reservoir 450 feet in length, and a dam and outlet at Thunder lake reservoir containing 35 cubic feet of concrete.

DeLand, Fla.—See "Streets and Roads."

Dublin, Ga.—An election will soon be held to vote on construction of a filtration plant with a capacity of 1,000,000 gals., to cost \$30,000. M. J. Guyton is City Engineer.

Bloomington, Ind.—An issue of \$62,000 municipal bonds of city sold to make improvements to municipal waterworks plant. Successful bidder was Bloomington National Bank, which bid premium of \$250 and accrued interest at date of delivery. Bonds will draw 6 per cent interest.

Portland, Ind.—See "Sewers."

Minneapolis, Kan.—City is considering the installing of a water works and electric light system which will cost about \$25,000.

Mayfield, Ky.—City contemplates an issue of \$200,000 in bonds to purchase the plant of Mayfield Water & Light Co.

Lake Charles, La.—Clinton S. Burns, of Kansas City, will represent city of Lake Charles, and Nicholas S. Hill, of New York, Lake Charles Railway, Light & Water Works Co. in the negotiations for purchase of local water works plant.

Monroe, La.—See "Streets and Roads."

Pittsfield, Mass.—It has been voted to lay 250 feet of water pipe on Norman Ave.; 500 feet of water pipe on Meade Ave.

Albert Lea, Minn.—A petition for a water main on Broadway to Virginia St. has been presented to the City Council.

Laurel, Miss.—See "Sewerage."

Highwood, Mont.—Water works will be installed including pump, 90 gals. per minute, total head 175 ft., reservoir 30,000 gals., 10 hydrants, probably steel pipe. Estimated cost is \$12,000. Gerhorz & Jaqueth Engineering Co., Great Falls, Mont., are Engrs.

Laurel, Neb.—Village board has let contract for a new single action triple pump for water works department. It will be capable of pumping 400 gallons a minute and will be operated from electric light engine.

Batavia, N. Y.—Mayor Harvey J. Burkhardt has engaged George Warren Fuller of New York to examine and report to common council on plans of Chester & Fleming of Pittsburgh, Pa., and I. Lundgaard of Rochester on proposed city improvements. Both Pittsburgh and Rochester engineers have presented different schemes for installing a pure water system, an improved electric light plant and sewage pumping system.

Syracuse, N. Y.—City contemplates erection of filtration plant.

and generators, pump and motor, \$4,362; *Westinghouse Electric, Pittsburgh, Pa., two Westinghouse generators with switch boards, \$2,300.

Rochester, N. Y.—See "Streets and Roads."

Rochester, N. Y.—*T. A. Gillespie Co., New York City, at \$412,030, for construction of 9½ miles pipe line. Steel pipe will be used.

Dover, O.—*The Massillon Iron & Steel Co., of Massillon, O., for furnishing pipe for main extensions, at \$800.61.

Urbana, O.—*Geyer & Grimes for repairing city water mains. *Wm. Williams for digging and filling trenches.

Erie, Pa.—*R. D. Wood & Co., for supplying 7,000 feet of cast iron pipe to cost approximately \$28,000.

Lebanon, Pa.—For water main extensions as follows: *Mangan & Pugh, \$14,312; F. J. Rely, Lancaster, \$14,521; Martin, Applegate & Earl, Myerstown, \$14,830; D. D. Sturgeon, Greensburg, \$16,423; J. U. Fritchey, \$17,027; Pitt Construction Co., \$17,906. Successful bidders figured on only 90 cts. for excavation, Pitt Co. fixing \$1.55 and Fritchey \$1.70; Sturgeon, \$1.70; Rely, \$1.06, and Martin, Applegate & Earl, 85 cts.

Mercer, Pa.—*Pitt Construction Co., of Pittsburgh, for the installation of a filtration plant.

Galveston, Tex.—A. P. Smith Mfg. Co., of East Orange, N. J., submitted bid of \$900 for valve-inserting machine for water works department.

Salt Lake City, Utah.—*Parrot Bros. for first unit of reservoir dam in Parleys Canyon, amount \$75,000.

Madison, W. Va.—Contract for water works has not been let as yet.

Port Orchard, Wash.—*A. W. Tweeden, Tacoma, Wash., for reservoir for Washington Veteran's Home, at \$3,550.

Winnipeg, Canada.—*Thomas Jackson & Son, Assiniboia, Can., water mains on Roseberry, College, Marjorie and Parkview Sts., at \$3,408. Contracts for the same streets were given to Hirst Engineering Co., at \$15,834.

MISCELLANEOUS.

Birmingham, Ala.—An election will be held June 5 to vote on bond issue of \$2,000,000 for development of public school system; \$500,000 for municipal lighting and power plant, and \$500,000 for auditorium.

San Francisco, Cal.—Board of supervisors has been petitioned that municipal railway be extended.

Bridgeport, Conn.—Hincks Bros., local brokers, awarded contract for \$2,275,000 city bonds with premium of \$38,085. Other bidders were: Merrill, Oldham & Co., Boston, \$2,310,922.25. Sidney Spitzer Co., Boston, \$2,286,375; Estabrook & Co., of Boston, \$2,301,845.

Pueblo, Col.—Gunnison City has purchased four lots on corner of Pine and Virginia Ave., as a site for city hall. It is proposed to erect a hall, with jail, hose cart room, town scales, treasurer's and marshal's offices, etc. Council has refunded \$33,000 of old water bonds and funded an additional \$10,000 of the floating improvement warrants.

Washington, D. C.—A firm in the United Kingdom desires quotations from American manufacturers of cast iron rain pipe and gutters; prices should be quoted c. i. f. destination if possible.

Washington, D. C.—A wholesale house in Spain, importing and dealing in sulphate of copper, desires to purchase in the United States crystallized sulphate of copper of 98/99 per cent, packed in sacks or barrels.

Washington, D. C.—A firm in Cuba desires to represent American manufacturers of electric motors, gasoline motors, electric fans, boats and electric supplies.

Kokomo, Ind.—A petition is to be circulated asking the county commissioners to appropriate funds to build a new court house.

Yorktown, Ia.—Special erection will be held to vote on \$1,500 bonds for erection of new town hall.

Monroe, La.—See "Streets and Roads."

Holyoke, Mass.—Playground commission plans to spend \$7,000 for improvements this year.

Springfield, Mass.—Police Commission will sell seven saddle horses and one

Iron ton, O.—Additional bond issue of \$125,000 for water purification plant has been recommended to finance committee.

Tulsa, Okla.—It has been decided to hold election shortly to vote on bond issues for purpose of improving city water system and for installation of fire station in south part of city.

Salem, Ore.—Officials of city of Silverton have filed application with State Engineer Lewis for permission to appropriate waters of Albqua creek. They intend to use water as a supplemental supply for the municipal water source.

Augusta, Pa.—*Morrison & Glover, for digging of canal to divert waters of Rocky Creek to Butler's Creek. There will be an excavation of 40,000 cu. yds. at 18 cts. per cu. yd. W. Z. Williams & Co., of Macon, are sub-contractors.

Harrisburg, Pa.—Among the permits and decrees issued by the Pennsylvania department of health relative to water works during the period from May 1 to 31, 1916, inclusive, were the following: Franklin City—Approving additional supply from new wells. Elizabeth (Monongahela Valley W. Co.)—Approving plans for improvements at existing filtration plant and requiring provision for additional capacity. Meadville—Approving additional supply from new well. S. Middleton township, Cumberland county (J. C. Bucher)—Approving extension of distributing system. Tri-Cities Water Co. (Charleroi & Donora)—Approving plans for additional sedimentation at filtration plant. Mercer (Mercer W. Co.)—Approving plans for filtration works. Aliquippa—Approving additional supply from new wells and requiring plans for disinfection during emergencies. Ashland—Approving plans for storage reservoir, filtration plant and fire service pumping station. Belle Vernon—(Belle Vernon W. Co.)—Approving plans for temporary germicidal treatment and requiring plans for permanent purification works. Johnsonburg (Johnsonburg W. Co.)—Approving outline plans for filtration works. Lewisburg (Lewisburg W. Co.)—Requiring filtration. Milton (Mountain W. Co.)—Requiring filtration. Point Marion (Springhill Water Co.)—Requiring germicidal treatment of present supply and either plans for filtration of same or development of new safe supply. Somerset—Approving plans for storage reservoir and additional drilled well supply. Watsonstown (Watsonstown W. Co.)—Requiring filtration. Wellsboro (Wellsboro W. Co.)—Approving plans for temporary germicidal treatment and requiring studies for permanent safe supply. White Deer township, Union county (White Deer Mountain W. Co.)—Withholding approval of proposed new surface supply unless filtered and requiring temporary disinfection and plans for permanent purification of the present supply. C. A. Emerson, Jr., acting chief engineer.

Providence, R. I.—Resolution authorizing issuance of bonds for \$1,000,000 by water supply board passed.

Bartlett, Tex.—Improvements to water works are being planned. Address City Engineer.

Crowell, Tex.—O'Neil & Sons, Dallas, Engrs., have been retained to make plans for proposed water works, to cost \$18,000. W. B. McCormick is City Secretary.

Galveston, Tex.—Estimates are being made on the cost of constructing a reservoir of 10,000,000 gallons capacity.

Ogden City, Utah.—See "Sewerage."

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates contract awarded.)

Los Angeles, Cal.—*Baker Iron Works, local, for furnishing and erecting a steel water tower and tank, and for furnishing auxiliary water supply to Warehouse No. 1, Municipal Dock No. 1, at \$4,760.

Fort Dodge, Ia.—Bates & Rogers Co. of Chicago was lowest bidder for work of building proposed municipal dam and powerhouse and furnishing all equipments. Its bid was \$86,500. Other bidders were: Koss Construction Co. of Des Moines, at \$89,295; Simms, Helmuth & Schaffner Co., of St. Paul, at \$103,900, and Foundation Co. of Chicago at \$104,663. Merkle-Hines Machinery Co. of Kansas City entered bid of \$21,500 for furnishing turbines, generators and accessories.

Wakeney, Kans.—For city water works improvement, as follows: *Chas. Steinberger, Wakeney, Kans., engine

automobile van, 1909 model Knox, in fairly good repair, originally worth \$3,500.

Albert Lea, Minn.—The sketch for a new detention hospital submitted by Mr. Jorgenson has been approved by the state. It will be a two story brick building, plans and specifications will be drawn at an early date.

St. Paul, Minn.—Purchasing committee rejected bids on three automobiles Commissioner Nash wants for his department. Only one bid was received under advertisement limiting cost of each machine to \$425.

Biloxi, Miss.—J. D. Ferguson of Biloxi, civil engineer, asked by city council to give an estimate of cost of constructing seawall on beach, states that work would require an outlay of \$200,000. Mr. Ferguson has not yet, however, submitted his official estimate of cost of the work.

Laurel, Miss.—See "sewerage."

Meridian, Miss.—J. M. T. Hamilton, owner of Hamilton's lake, is preparing to offer lake and about 140 acres of land adjacent, to city for public park and summer resort. Property will be offered for \$30,000, to be paid for in serial bonds maturing annually, bearing 5 per cent. interest payable semi-annually.

Elizabeth, N. J.—For removing garbage, ashes, etc., for period of three years, bids were as follows: Thomas Vincent, present scavenger contractor, for \$69,975; Matthew Wade, for \$90,000.

Freehold, N. J.—Bids will be received here by Chas. F. McDonald, county collector, until June 9th, for purchase of \$55,000 court house bonds.

Buffalo, N. Y.—Proposed sale of city bonds which was to have taken place May 25 was postponed until June 16th at 11 a. m., because of 30-day clause in new charter. More than \$1,500,000 worth of bonds are to be offered for sale.

Brooklyn, N. Y.—Contract to be made between Interborough Rapid Transit Co. and Snare & Triest Co., for doing work of connecting up Second Ave. elevated line in Manhattan with new elevated lines in Queens to Astoria and Corona, has been approved by Public Service Commission.

Brooklyn, N. Y.—Mason & Hanger of Richmond, Ky., for section of subway at \$1,500,000.

Hudson, N. Y.—Bids for 4½ per cent bonds for new school in District 1, town of Greenport, the amount being \$12,000, were as follows: Hudson City Savings Institution, 1009.70; George B. Gibbons & Co., New York City, 1003.80; H. A. Kahler & Co., New York, 1002.80; Isaac W. Sherill Co., Poughkeepsie, 1002.70. As Hudson City Savings Institution was the highest bidder, the bonds were awarded to it. Plans have been drawn by Architect DeProsse, of Hudson, for a new school for the district.

Hamilton, O.—City proposes to issue bonds from \$200,000 to \$300,000 for the purchase of property and erection of a city hall.

Medford, Ore.—City council has been authorized to issue \$300,000 bonds for building, acquiring and operating a railway within and without the city. Council will receive proposals for construction of road.

Roseburg, Ore.—Citizens of Roseburg have voted an amendment to bond issue of \$300,000 previously passed, authorizing city council to build a railroad to Rock creek, distance of 24 miles.

Pawtucket, R. I.—The Park Commissioners have asked City Council for appropriation of \$22,000 for construction of building incorporating field house, boat house and sanitary.

Chattanooga, Tenn.—City officials are contemplating installation of garbage disposal plant.

Galveston, Tex.—Kansas City Scenic Co. for equipment for new auditorium, approximately \$3,800.

Wichita Falls, Tex.—Citizens have voted \$65,000 bond issue for schools.

Portsmouth, Va.—Public property committee recommends plans for taking over new and modern central market at cost of \$60,000.

Richmond, Va.—Favorable report of City Engineer Bolling on plan to change course of Shockoe Creek so that stream will run under 15th St. was received by administrative Board. City engineers says work can be done at a cost of \$713,-

126.35, against estimated cost of closing in creek all along its present course, which is \$1,144,802.

Spokane, Wash.—Plans and specifications for city's new public comfort station underneath Northern Pacific tracks at Howard St., have been passed by City Council and bids for work advertised for. Total cost of station will be \$7,000 of which \$4,200 will be for fixtures.

Superior, Wis.—June 20 was set as date for hearing petitions to vacate certain streets, avenues and alleys in Gates addition at Central Park, consisting of property bought some time ago to enlarge park. Communication has been received from board of education submitting copy of plans, specifications and an estimate of cost of new Franklin school addition at Allouez. Addition will cost \$65,000.

Superior, Wis.—Board of education has submitted plans, specifications and estimates of cost of constructing an addition to Franklin school building.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates contract awarded.)

Sacramento, Cal.—Low bidders for constructing Sacramento weir were Teichert & Ambrose at \$336,640, and S. Williams at \$357,034. Engineer's estimate was \$460,000. F. C. Miller is city engineer.

Pekin, Ill.—Jost & Schmidt, Pekin, for building cement walks around court house, for \$1,900.

Northampton, Mass.—Buffalo Steam Roller Co. for new steam roller.

Springfield, Mass.—Providence Steel & Iron Co., for steel work on Logan St. Generator at \$2,270.

Brooklyn, N. Y.—For construction of section 2 of Fourteenth St.—Eastern District rapid transit line, Degnon Contracting Co. was lowest bidder at \$1,927,000. The only other bidder under \$2,000,000 was MacArthur Bros. Co. and Nathan Hanger & Co., Inc., who bid \$1,996,000.

Brooklyn, N. Y.—Degnan Contracting Co., last underground section of Eastern District subway, for \$1,972,349.

TOO LATE FOR CLASSIFICATION

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS.				
Wis., Superior	2 p.m., June 10	Grading seven roads.....	C. J. Morisset, Co. Hwy. Comr.
Mass., Boston	noon, June 12	Paving with granite or Hassam block.....	E. F. Murphy, Comr. of P. W.
Pa., Chester	10 a.m., June 12	45,000 sq. yds. of pavement.....	City Engineer.
Cal., Sacramento	11 a.m., June 13	Grading and repaving asphaltic concrete.....	M. J. Desmond, City Clerk.
Ky., Lexington	noon, June 14	20 miles first class pavement.....	County Road Engineer.
Ind., Indianapolis	10 a.m., June 14	Improving and paving streets and alleys.....	Board of Public Works.
O., Bowling Green	noon, June 16	Grading, curbing and paving streets.....	J. E. Baird, Service Director.
Ind., Broad Ripple	7.30 p.m., June 19	Constructing cement curbs.....	Board of Trustees.
O., Lisbon	1 p.m., June 21	11,562 sq. yds. slag macadam and 7,549 cu. yds. of excavation.....	H. R. Dickey, Clerk.
O., Lisbon	1 p.m., June 22	8,479 sq. yds. brick or concrete pavement and 11,328 cu. yds. of excavation.....	H. R. Dickey, Clerk.
Pa., Ebensburg	1 p.m., June 23	2 miles of brick paving, 690,000 paving brick.....	O. P. Thomas, Co. Engineer, Leader Bldg., Johnstown, Pa.
Ia., Marshalltown	9 a.m., June 26	33,000 sq. yds. concrete pavement, 28,000 ft. curb and 23,000 sq. yds. clay-gravel.....	W. H. Steiner, City Engr.
Ind., Warsaw	1 p.m., June 30	Constructing county line road.....	V. D. Mock, Co. Aud.
SEWERAGE.				
Mass., Boston	noon, June 12	Constructing pipe sewers and drains.....	E. F. Murphy, Comr. of P. W.
Minn., Duluth	11 a.m., June 14	Constructing sanitary sewer.....	J. A. Farrell, Comr. P. W.
Minn., Duluth	11 a.m., June 15	Constructing sanitary sewer.....	J. A. Farrell, Comr. P. W.
Pa., Pittsburgh	8 p.m., June 15	Constructing sanitary sewers, requiring 25,000 ft. 8 to 18-in. pipe, etc., work to be done at Brentwood, Pa.....	Douglas & McKnight, Engrs., Union Bk. Bldg., Pittsburgh.
O., Bowling Green	noon, June 16	Constructing sanitary sewers.....	J. E. Baird, Service Director.
Ind., Winchester	10.30 a.m., June 17	Furnishing drain tile and constructing ditch.....	A. B. Purdy, Drainage Comr.
Ind., Michigan City	10 a.m., June 20	Two 10-in. vitrified tile sewers.....	Board of Public Works.
WATER SUPPLY.				
Ind., Jasper	8 p.m., June 15	Installing pressure filtration plant.....	S. A. Berger, City Clerk.
Ia., Fort Madison	June 15	Pumping and filtration plants.....	T. T. Hitch, Pres. Citizens' Water Co.
N. J., Newark	1.30 p.m., June 27	Water supply for almshouse.....	F. A. Phelps, Union Bldg., Newark, Arch. & Engr.
MISCELLANEOUS.				
Ind., Lebanon	9.30 a.m., June 19	Constructing public drain.....	E. J. Moore, Supt. of Constr.
Ind., Blaine	1.30 p.m., June 19	Cleaning and repairing two ditches.....	Fred Rowls, Township Trustee, Portland, Ind.
Ind., Ponv	1.30 p.m., June 23	Cleaning and repairing drainage ditch.....	Fred Rowls, Township Trustee, Portland, Ind.

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Mark R. Lamb, Huerfanos 1157, Casilla 2653, Santiago, Chile

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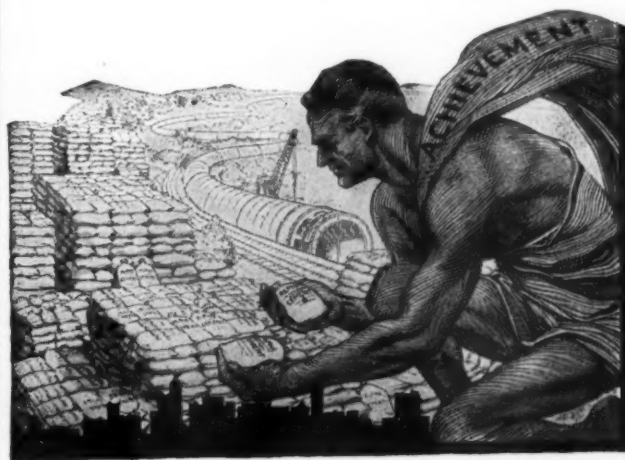
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STREETS AND ROADS

Redding, Cal.—Resolutions favoring the proposed \$15,000,000 bond issue for state highway have been adopted.

Sacramento, Cal.—The City Commission has ordered the repairing of several streets.

Tijuana, Cal.—Bids for improving the roads from race course to Tijuana, about the custom house and other prominent thoroughfares in Tijuana are asked for by the management of the regional fair. Antonio Elosua is general manager of the fair. All bids should be sent to rooms 911-12 American National Bank building.

Stratford, Conn.—It is proposed to build a new road from Main St. to Ferry Blvd., starting at the railroad bridge.

Waukegan, Ill.—Decision on paving Tenth St. is delayed. Oak St. will be paved with brick at an estimated cost of \$20,400.54. South Ave. will be paved with concrete west of Marion St., at an

estimated cost of \$9,295.14, and east of Marion St. with limestone macadam.

Crawfordsville, Ind.—Ira Clouser has bought \$15,700 of 4½ per cent. gravel road bonds.

Huntington, Ind.—A petition has been received for the paving of Leopold St. from Tipton to Second St. Bids will be received for paving Court St. with brick, cement filling.

Indianapolis, Ind.—Resolutions have been confirmed by board of public works for improving several streets.

Martinsville, Ind.—Road bonds in sum of \$9,500 have been sold by County Treasurer Rosenbaum to Dr. H. C. Robinson for the Home Building Association of this city, at a premium of \$207. Nine bids were submitted.

Council Bluffs, Ia.—Bids will be advertised for after June 26 for the repairing of streets and sewers.

Sault Sainte Marie, Mich.—The paving of Portage Ave. from Ashman St. west to Mackenzie St. is under consideration.

Kansas City, Mo.—Work on repairing the streets is at a stand still and Council will be asked to push ordinances necessary to hasten work.

Kansas City, Mo.—City has sold road bonds amounting to \$275,000.

Herkimer, N. Y.—It is proposed to repair several streets for which concrete will be used for some and bitulithic for others.

Marion, O.—Four foot sandstone sidewalks are to be constructed on several streets.

Toledo, O.—The resurfacing of Sandusky St. is under consideration.

Urbana, O.—There will be repairs made on several streets.

Erie, Pa.—Improvements on 23d St. will cost nearly \$10,000.

Wilkes-Barre, Pa.—Ranging in their bids from \$54,000 to \$78,000, seven contractors bid for contract for surfacing and repairing the Hillside road. As the prices vary on the different parts of work to be performed awarding of contract was postponed. Bidders were: D. M. Rosser, W. S. Conover, P. J. Boyle, State Paving Co., Herrick Construction Co., B. G. Coon Construction Co., and M. J. Malloy. Charles A. McDade of this city, for steel posts, \$1.85 each for 200 posts and \$2.28 each for 50 heavier posts.

Westerly, R. I.—Plans are completed for laying of new sidewalk on Mechanic St. and bids will be asked for soon.

BIDS RECEIVE DAND CONTRACTS AWARDED.

(*Indicates contracts awarded).

Los Angeles, Cal.—Road Commissioner Joyner thinks bids for construction of last mile of Mint Canyon road, which runs through Palmdale are too high, and recommends that they be rejected. There were three bids, as follows: Edward J. Hein, \$3,546; H. E. Cox, \$3,992; Oscar Ford, \$5,172. The engineer's estimate was \$2,979, the lowest bid received being about \$600 above this. Mr. Joyner suggest that this mile of road be included in 11 miles soon to be advertised.

Bridgeport, Conn.—Hawley Ave., 560 ft., *Pierce Mfg. Co., \$652; B. D. Pierce Co., \$738; Burns Co., \$965. Denver Ave., 350 ft., *Pierce Co., \$303; B. D. Pierce Co., \$408; Burns Co., \$453. East Eaton st., 210 ft., *Pierce Co., \$239; B. D. Pierce Co., \$255; Burns Co., \$399. Gurdon St., 540 ft., *Pierce Co., \$845.80; B. D. Pierce Co., \$944.50; Burns Co., \$1,353. Herkimer St., 680 ft., *Pierce Co., \$585.10; B. D. Pierce Co., \$873.50; Burns Co., \$992. Laurel and Capitol Aves., 910 ft., *Pierce Co., \$1,494.50; B. D. Pierce Co., \$1,764.80; Burns Co., \$2,550; Tony Lapodule, \$6,217.50. Linen Ave., 250 ft., *Burns Co., \$782.50; Pierce Co., \$912.50; B. D. Pierce Co., \$1,177. Wade terrace, 260 ft., *Pierce Co., \$215.80; B. D. Pierce Co., \$301.20; Burns Co., \$330.

Princeton, Ind.—*H. M. Morgan for oiling streets at \$2.95 a sq. yd.

Detroit, Me.—*H. A. & S. G. Day, Bangor, Me., for 2.85 miles highway gravel surface at \$15,878.40. Other bidders were: Noyes & Campbell Co., Augusta, Me., \$24,392.35; A. Williams Co., Boston, Mass., \$18,332.25; Bradbury Smith, West Sullivan, Me., \$16,592.68; D. D. Pietro, Boston, Mass., \$20,215.63; E. J. Mitchell, Oakland, Me., \$23,999.25.

Palmyra, Me.—*A. Williams Co., Boston, Mass., for 2.56 miles highway gravel surface, at \$15,353.45. Other bidders were: Noyes & Campbell Co., Augusta, Me., \$21,548.65; E. J. Mitchell, Oakland, Me., \$19,296.25; D. D. Pietro, Boston, Mass., \$16,149.40; Bradbury Smith, West Sullivan, Me., \$16,705.81.

Hudson, Mich.—*H. P. Streicher Co., Toledo, O., for resurfacing 22,000 sq. yds. concrete pavement with 2-in. asphaltic concrete, at 93 cts. per sq. yd. Other bidders were: Johnson Construction Co., Chicago, Ill., at 86 cts. per sq. yd., and Elyria Construction Co., Elyria, O., at 83 cts. per sq. yd. Fred. P. George is City Clerk.

Columbus, Miss.—*Owen Construction Co., Brooksville, for construction of 3½ miles of first class road at \$5,700.

Plainfield, N. J.—*C. H. Winans & Co. for resurfacing with tarvia and crushed stone, Springfield Ave. road from Summit to Passaic River for \$13,442; Edgar road from Elizabeth to Rahway, for \$16,389.45; West Grand St. and First Ave., from Elizabeth to Roselle, for \$5,827.50. *Weldon Contracting Co., for re-

Kansas City, Mo.—City has sold park and warehouse bonds amounting to \$275,000.

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NOTICE TO CONTRACTORS

Sharpsville, Pa., May 26th, 1916.

Sealed proposals will be received until 12.00
o'clock noon, Tuesday, June, the 20th, 1916, at
the office of William A. Graber, Secretary, Bor-
ough of Sharpsville, Pa., for the paving of
Mercer Avenue, from Big-Cut Bridge to the
south line of Walnut Street, with such mate-
rials as Council may select; the engineer's esti-
mate of the work is 6,865 square yards.

Specifications and bidding sheets can be had
at the office of the secretary or Borough Engi-
neer.

The Borough Council reserves the right to
reject any or all bids.

WILLIAM A. GRABER,
Secretary Sharpsville Borough.

TREASURY DEPARTMENT, Supervising Archi-
tect's Office, Washington, D. C., May 25,
1916.—SEALED PROPOSALS will be opened in
this office at 3 p. m., June 20, 1916, for the con-
struction complete of the United States Post
Office at Waterloo, N. Y. Drawings and speci-
fications may be obtained from the Custodian
of site at Waterloo, N. Y., or at this office,
in the discretion of the Supervising Architect.
Jas. A. Wetmore, Acting Supervising Archi-
tect.

OFFICE OF THE STATE COMMISSION OF
HIGHWAYS.

Albany, N. Y.

Sealed proposals will be received by the undersigned at
their office, No. 55 Lancaster Street, Albany, N. Y., at
1 o'clock P. M., on Monday, the 26th day of June, 1916,
for the construction of highways in the following coun-
ties:

Hamilton (one highway—approx. 4.22 mi.); Otsego
(one highway—approx. 12.66 mi.); Wyoming (one high-
way—approx. 3.52 mi.).

Also for the repair of the following:

Albany (two contracts—concrete pavement and resur-
facing); Cayuga (two contracts—resurfacing); Cortland
(two contracts—resurfacing); Delaware (one contract—
resurfacing); Essex (one contract—surface treatment);
Herkimer (one contract—resurfacing); Livingston (one
contract—resurfacing); Montgomery (two contracts—re-
surfacing and surface treatment); Niagara (one contract
—resurfacing); Oneida (one contract—resurfacing); Onon-
daga (six contracts—resurfacing and surface treatment);
Rensselaer (two contracts—resurfacing); Sullivan (one
contract—resurfacing); Westchester (one contract—sur-
face treatment);

and also for the furnishing and delivering of broken stone
for maintenance work on Road No. 756 and 5187, known
as Broken Stone Contract No. 70, Essex County.

Maps, plans, specifications and estimates may be seen
and proposal forms obtained at the office of the Commis-
sion in Albany, N. Y., and also at the office of the Divi-
sion Engineers in whose division the roads are to be im-
proved. The addresses of the division engineers and the
counties in which they are in charge will be furnished on
request.

The especial attention of bidders is called to "GEN-
ERAL INFORMATION FOR BIDDERS" in the itemized
proposal specifications and contract agreement.

EDWIN DUFFEY,
Commissioner.

I. J. MORRIS,
Secretary.

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ton & White, Inc., c/o The
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